UARY, 1958

RUBBER WORLD

nts, page 488

SERVING THE RUBBER INDUSTRY SINCE 1889

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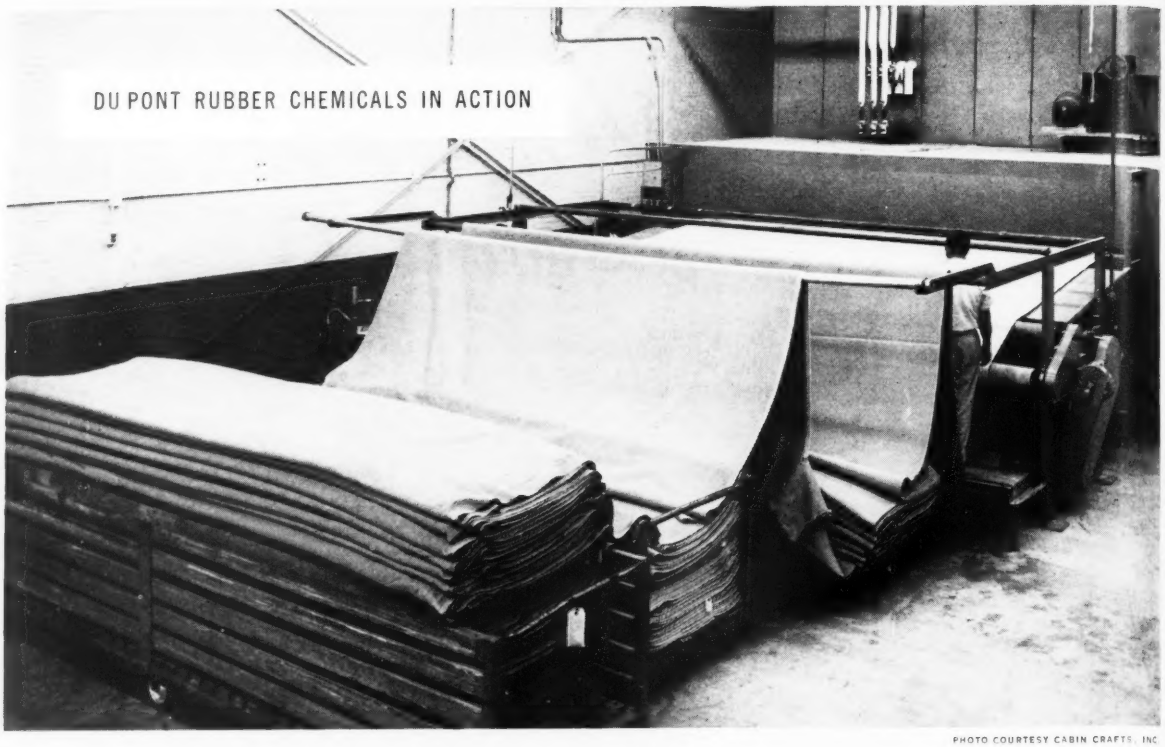
BLICATION

NEW-TYPE ALUMINUM DOME STRUCTURE ERECTED WITH NYLON-RUBBER BALLOONS

Page 582



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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

RUBBER WORLD, January, 1958, Vol. 137, No. 4. Published monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada $6.00. All other countries $7.00. Single copies 50¢. Address Mail to N. Y. Office. Copyright January, 1958, by Bill Brothers Publishing Corp.

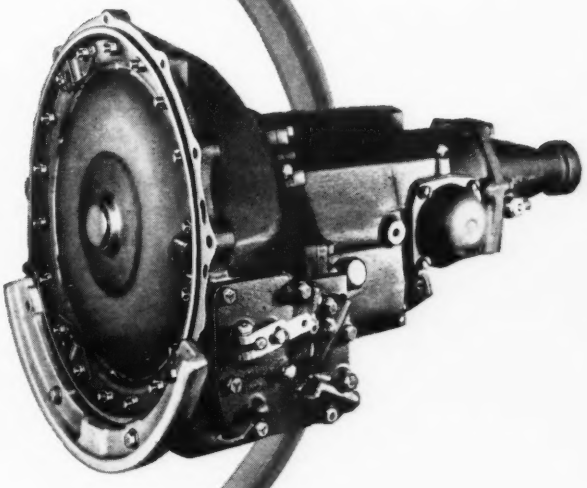
News about

B.F.Goodrich Chemical *raw materials*

For transmission seals and gaskets...

HYCAR 4021 RUBBER

resists sulfur-bearing, extreme-pressure lubricants at high temperatures



MANY of the oils used in automobile and truck automatic transmissions are designed for high pressure service and contain sulfur-bearing additives to protect the oil. Unlike conventional oil-resistant rubbers, Hycar 4021 is *not hardened* by sulfur-bearing oils. Vulcanized parts of this material maintain flexibility throughout their life in this service.

Hycar 4021, a polyacrylic rubber, is ideal for transmission seals and gaskets, as well as other automotive applications including hose, O-rings, and similar parts. This material has a useful temperature range 50 to 100 degrees higher than the best nitrile type rubber. It withstands most lubricating oils at 350°F for extended periods, and temperatures up to 400°F for short periods.

In addition, vulcanizates of Hycar 4021 are virtually unaffected by oxygen, ozone, or sunlight, will not crack or check, and have tensile strength and elongation suitable for most applications. Finished parts have excellent flex life, resistance to cut growth, and compression set.

Hycar 4021 is one of many types of special purpose rubbers furnished in raw material form and available now. For further information write Dept. KB-1, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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ARTICLE HIGHLIGHTS

USEFUL UNVULCANIZED URETHANE POLYMER

A linear poly(ester-urethane) called Polyurethane VC has been developed which displays the properties of a rubber vulcanizate and has a practical degree of solvent resistance without vulcanization. **549**

LIGHT-COLORED, NON-BLOOMING BUTYL COMPOUNDS

The proper types and amounts of accelerators, processing aids, and mineral fillers, and the proper mixing conditions for the production of light-colored, non-blooming butyl rubber compounds are described at some length in this paper. **557**

IMPROVING TECHNICAL MANPOWER SUPPLY AND USE

The importance of increasing the supply of technical manpower and using the existing supply more effectively has become more important because of Sputniks I and II. **547**

RUBBER & PLASTICS DIVISION, ASME, MEETING

Papers on product design with emphasis on proper use of material properties, on test methods for the development of proper design criteria, and on new materials were presented at this meeting. **569**

SIXTH ANNUAL WIRE AND CABLE SYMPOSIUM

This program included papers on polyethylene, small-scale electrical testing of polyvinyl chloride insulation, and extrusion methods of special nature. **571**

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VOLUME 137, NUMBER 4 JANUARY, 1958

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The opinions expressed by our contributors do not necessarily reflect those of our editors.

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Letters to the Editor

Re: Perforated Pages

DEAR SIR:

I certainly appreciate your perforating some of the pages of the October and November issues of RUBBER WORLD.

I, for one, would like it very much if all of the pages were perforated.

HARRY E. WHITMORE

Reilly Tar & Chemical Corp.,
Indianapolis, Ind.

DEAR SIR:

I do like the scored pages very much for the following reasons:

1. It enables us to remove a page that contains some information we wish and thus put it in our files.
2. We can take a page out without destroying the magazine.

I do hope you receive other favorable replies.

S. COLLIER

Johns-Manville Corp.,
New York, N. Y.

DEAR SIR:

I like the page perforations in RUBBER WORLD very much and hope that you will continue them.

JAMES H. BOYD

Consulting Chemical Engineer,
New York, N. Y.

DEAR SIR:

Scored pages are definitely approved in this department. As librarian, I receive many requests to save certain magazine articles for our vertical files, and pages from a perforated magazine are much easier to pull and neater to handle. Others among our personnel, who like to save articles for their personal files, are equally impressed.

Since we tear out only articles or data pertinent to work being carried on in this department, we do not deem it necessary to perforate all pages. However, some readers may find it useful.

Please continue this project. It is a great improvement.

G. EICHSTAEDT

Deere & Co.,
Materials Engineering Dept.,
Moline, Ill.

DEAR SIR:

May we register a complaint about your new policy of scoring pages to make them easier to rip out? As a library, we bind and keep RUBBER WORLD indefinitely. Not only does the scoring practically invite our clientele to tear out pages from the library's copy, but we are afraid that, in the process of binding volumes and with ordinary wear and tear over the years, valuable pages will be lost or mutilated.

BARBARA M. DAVIS

Godfrey L. Cabot, Inc.,
Cambridge, Mass.

(Continued on page 620)

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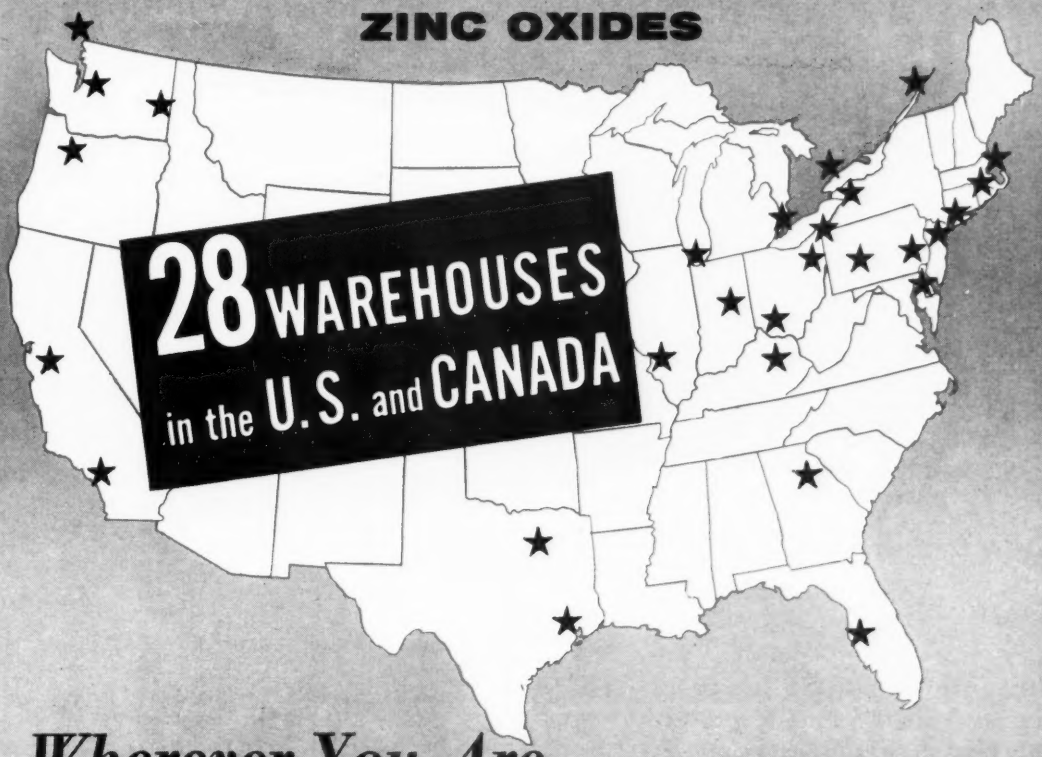

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While designed primarily for laboratory work, the NRM 1½" Extruder is widely used in the industry for production of small cross-section extrusions. For use with the 1½", NRM offers rod and tubing dies, as well as a special die for testing the extrudability of stocks. Write for more details on this time saving, money-making NRM 1½" Rubber Extruder today.

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Explains the construction, operation and performance features of NRM Rubber Extruders. Read the facts and make your next extruder purchase an NRM.

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Photo courtesy Wilson Sporting Goods Co., Chicago, Illinois, and Haartz-Mason, Inc., Watertown, Mass.

It gives them a true "kick"—weather or not!

It used to be that low cost footballs couldn't match the spirit of their young users. When the going got wet, they would go out of round and lose their stability in the air. They also would lose their pebble embossing and become hard to handle.

What was needed was a new kind of cover. This took some doing but finally a leading fabric coater came up with a successful solution—a thick, heavy-duty coating based on PLIOFLEX rubber. Result: A tough, long-wearing cover that withstands the wettest weather, without losing its shape or embossing.

The major reasons for using PLIOFLEX in these covers are: First, its permanently light color permits bright, clean colors without the expense of natural rubber. And second, its high uniformity makes possible a product of consistently high quality.

Perhaps PLIOFLEX can give you a truer performing product. For the full story, including complete technical assistance, on PLIOFLEX and other raw materials for the rubber industry, write to

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Chemigum, Plioflex, Pliolite, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Photo courtesy Cameron Iron Works, Inc., Houston, Texas, and Linear, Inc., Philadelphia, Pa.—Manufacturers of Precision Molded Seals

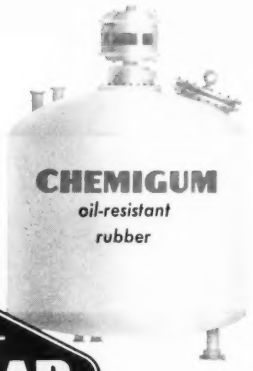
How to make 4 lbs. of rubber pack a 1000-ton load

To batter a billet into rough shape, prior to machining, is no chore for the hydraulic forging press shown above. A press of a button and it works down the hot steel with a thousand tons of pressure every several seconds.

But it was a chore to find an adequate seal for the big press ram. Its designers looked long and hard before they found a split ring packing that would not leak under the high pressure and fast traverse.

Twin secret of the success of the fabric-reinforced, precision-molded, rubber rings now used are their unique design—and CHEMIGUM. A series of internal, V-shaped dams and external abutments seal off any labyrinth leakage, while the CHEMIGUM assures a lastingly tight fit.

The reasons why the ring manufacturer uses CHEMIGUM for this and other precision seals are its excellent resistance to oil, heat and abrasion and its unusual ease of processing. How can this outstanding combination of properties benefit your product? For details, write to Goodyear, Chemical Division, Dept. M-9419, Akron 16, Ohio.



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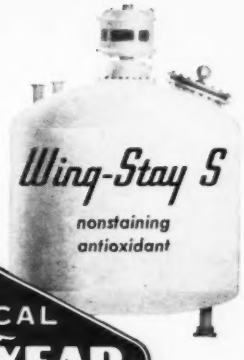

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RUBBER & RUBBER CHEMICALS DEPARTMENT

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic, Wing-Stay—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Which of these resins can help you make a better nitrile rubber compound?

To meet your needs for reinforcement of nitrile rubbers, Durez offers a wide choice of specially formulated phenolic resins.

Completely compatible with nitrile rubbers, these resins serve as thermosetting plasticizers. Upon melting at process temperatures, they soften and plasticize the stock.

Chemical reaction causes vulcanization of the rubber, with substantial gains in strength, hardness, stiffness, abrasion resistance, heat and chemical resistance of the final cured stock.

Compatibility and reactivity increase with increasing nitrile content.

In recipes employing 75 parts or less of resin on 100 parts of nitrile rubber, it is possible to reduce the amount of sulfur accelerators and reinforcing fillers normally used, because of the vulcanizing effect of the resin.

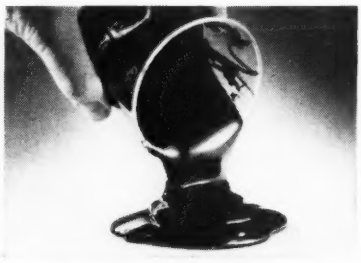
With higher resin content (100 parts or more), all sulfur and accelerators may be omitted. Fillers may be used to increase strength and reduce cost.

For use with nitrile-type copolymers, the following Durez resins are recommended:

12687 and 12707 powdered resins • Of these two resins, 12687 is considered the more generally useful and effective. The 12707 powdered resin is the same as 12687 except less reactive. It is useful in compounds that have a tendency to be scorchy. Stocks made with 12707 are lower in hardness and tensile strength and higher in elongation than stocks containing an equivalent amount of 12687.

12686 lump resin • This is the base resin from which 12687 is made. It is supplied in lump or crushed form. In crushed form, it is entirely thermoplastic and can be safely used in compounding where high temperatures are encountered, as in Banbury mixing. It requires addition of 8% hexamethylenetetramine during the last stage of Banbury mixing or on warm-up mill to make it properly thermosetting and give properties equivalent to 12687.

11504 resin • Supplied as a soft brittle resin, 11504 is useful in compounding stocks in the softer range —40-60 hardness. It requires addition of 8% hexamethylenetetramine to make it properly thermosetting.



13037 liquid resin • This is the same basic type of resin as 12686, but in heavy liquid resin form. It can be used with other resins to obtain further softening of the stock during compounding without strongly affecting other properties. Alone, it does not contribute as much hardness and reinforcement to nitrile rubber stocks as do 12687 or 11504 resins. It requires addition of 10% hexamethylenetetramine to make it properly thermosetting.

Where else can Durez resins help you get properties you want?

GRS and natural rubber compounds • As plasticizers, Durez resins impart hardness, stiffness, and abrasion resistance to compounded stocks of GRS and natural rubber. Hardness and stiffness are retained at high temperatures. Compatibility with GRS is improved by using some nitrile rubber in the recipe.

Solvent-type adhesives • Excellent adhesives can be produced using Durez resins with nitrile rubber, natural rubber, and Neoprene. Durez resins have been used successfully as an adhesive for bonding uncured and cured nitrile rubber stocks to various metals during molding.

Synthetic rubber latices • A highly effective means of hardening and reinforcing nitrile rubber latices is the use of Durez resin emulsions developed for this purpose. For modifying the properties of latex-treated papers, a water-soluble liquid resin is available. So far, the use of these resins is confined mainly to nitrile rubber latices. However, one Durez resin has produced very satisfactory results with certain high-styrene-butadiene latices.

For a more complete description of the application of Durez resins in compounding, in solvent cements, and in modification of latices, write for the illustrated bulletin, "Durez Resins in the Rubber Industry."

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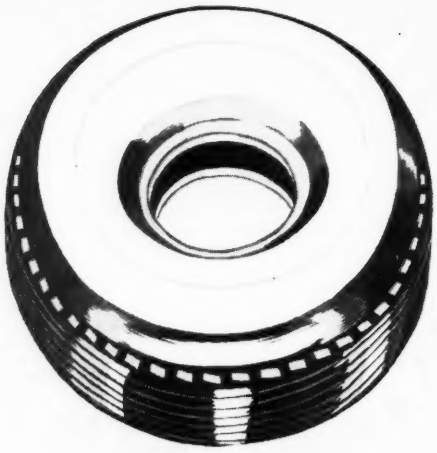

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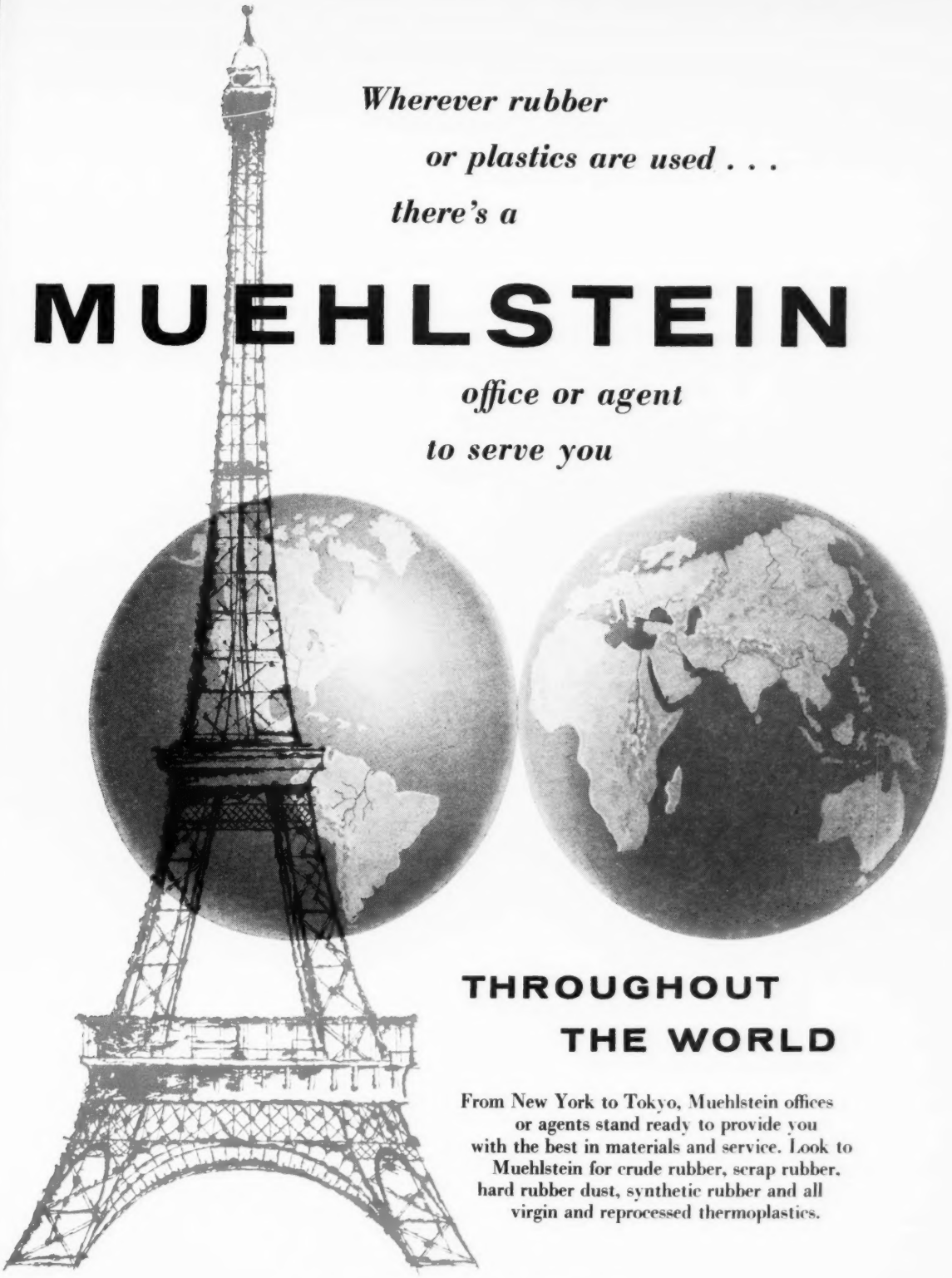

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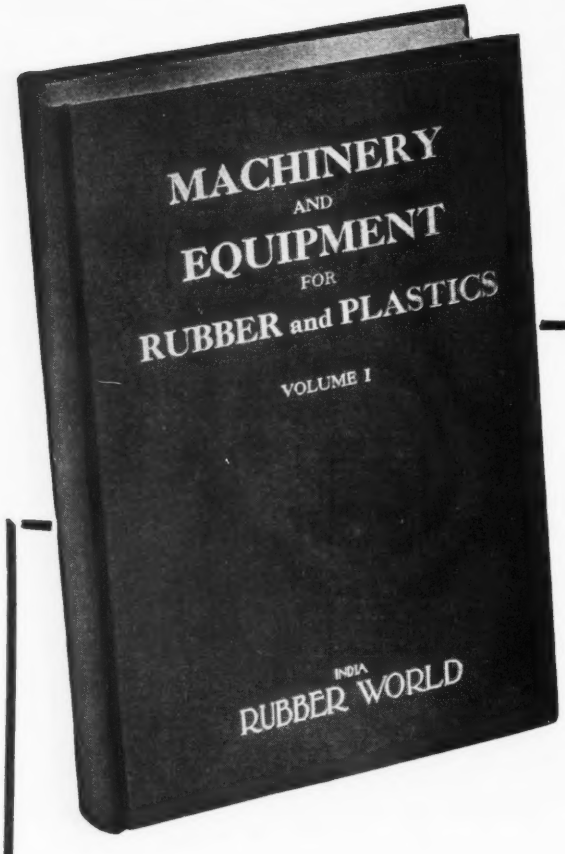

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SANTOFLEX AW... antiozonant pioneer guards rubber against cracking caused by ozone attack... sets the "standard for comparison"

"Small but virulent" aptly describes ozone as it acts on rubber. In today's technology, ozone is recognized as the insidious culprit it is...often the cause of troubles previously attributed to poor compounds, excessive flexing, sunshine and heat! Ozone's drastic effect on the physical properties of rubber under stress shows up in the formation of cracks—a few deep ones or a myriad of small ones.

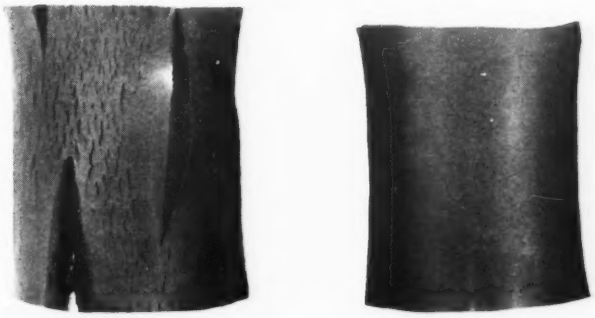
Although ozone rarely occurs naturally in concentrations as high as 50 parts per 100 million parts of air, it is universally present in the atmosphere, *always* a threat to rubber, especially under dynamic stress, and even when stored under static load. Santoflex vaccinates styrene-butadiene rubber, as well as natural and nitrile rubbers, against ozone attack.

Like the blooming type of waxes and other antiozonants, Santoflex AW is capable of slow migration to supply a continuous protective barrier. But unlike wax, which is often undesirable and ineffective because the wax film ruptures upon flexing, Santoflex AW retards flex cracking even under dynamic stress.

Quantity needed to materially reduce or eliminate cracking due to ozone attack will vary with the compound and the severity of attack, but usually a level of 2.0% on the rubber content is a safe amount for protection in average cases. If both static and dynamic service conditions are involved, a small amount of blooming wax (paraffin wax with a 135-145° F. melting point, for example) will usually reinforce the antiozonant protection of Santoflex AW.

Santoflex AW was the first commercial antiozonant for rubber . . . and through its twelve years' successful use in tire sidewalls, power-cable insulation and other electrical applications, tubing, motor mounts and similar products, sets the highest "standard for comparison" of ozone protection. When you suspect your compounds will be exposed to ozone attack under stress, if you come up against a flex-cracking problem caused by ozone, or if you are now using another antiozonant, try Santoflex AW and *see* the difference *it* makes. We'll be glad to help. Just write:

STATIC OZONE TEST (48 hours)



No Antiozonant — Santoflex AW

DYNAMIC OZONE TEST (48 hours—36,000 flexes)

No Antiozonant — Santoflex AW

See the difference Santoflex AW makes in tire tread stock placed under stress and exposed to approximately 50 parts of ozone per 100 million parts of air for 48 hours.

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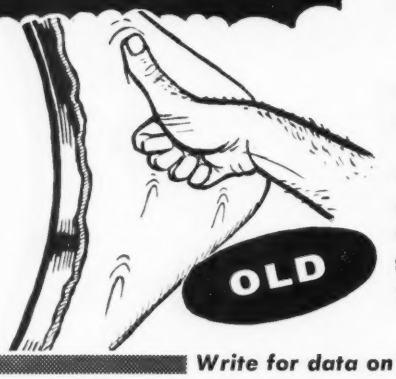

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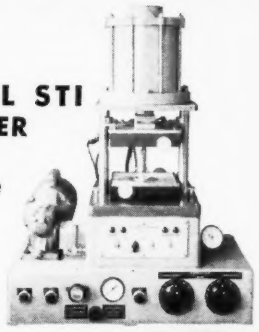

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Personnel, policies, facilities and location remain unchanged. Our aim, as always, will be to strive continually for still better quality of product and service to the many customers and friends in the plastics, packaging, paper, rubber, textile and industrial finishing fields who have helped to make this company the country's largest producer of flock.

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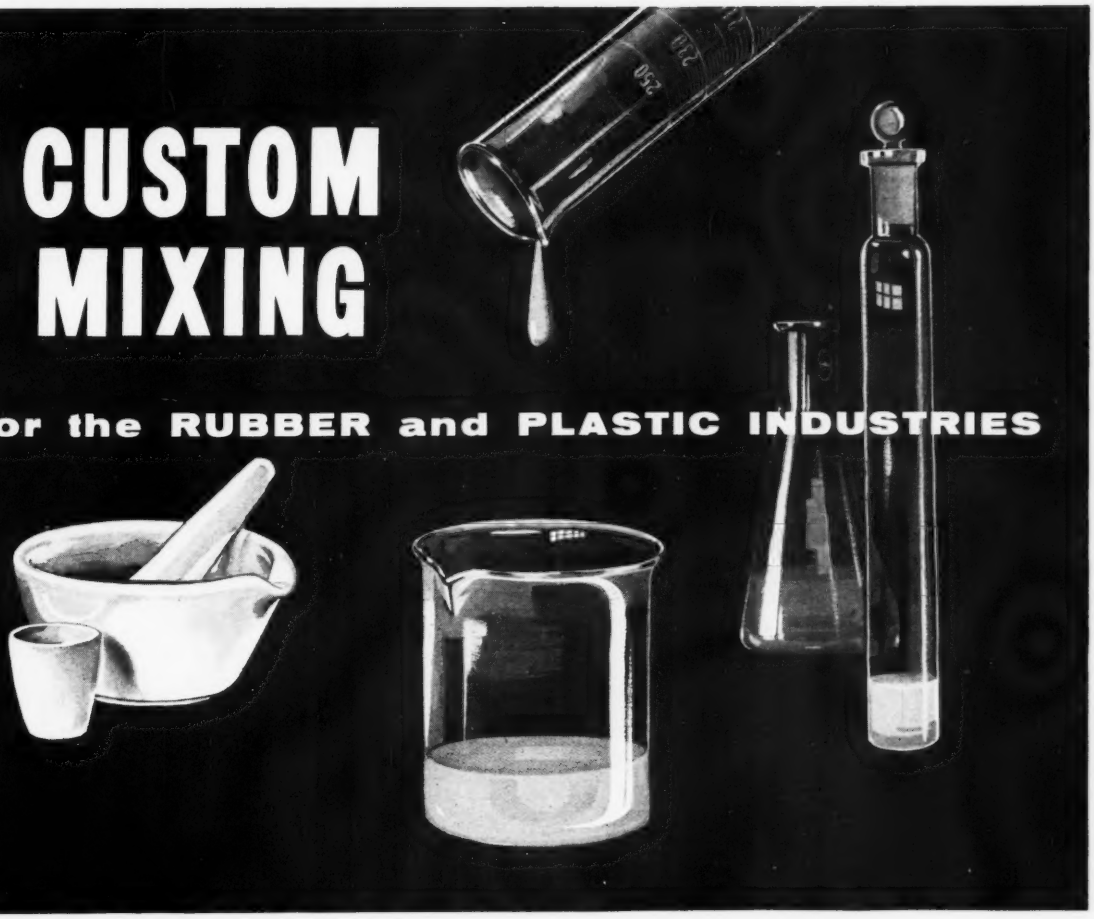

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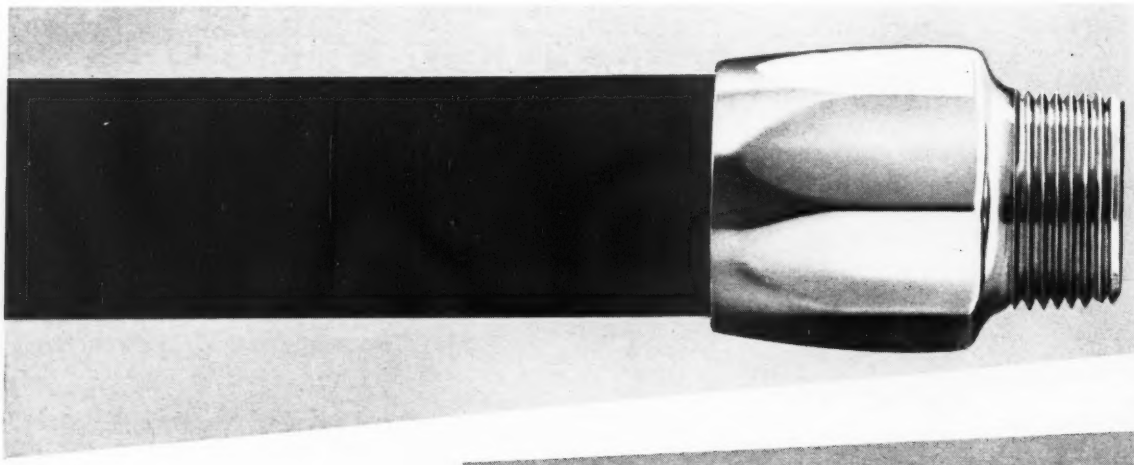

Permanently-attached—like all Scovill permanently-attached couplings, the aluminum coupling provides maximum safety and full flow.

20% LESS IN COST!

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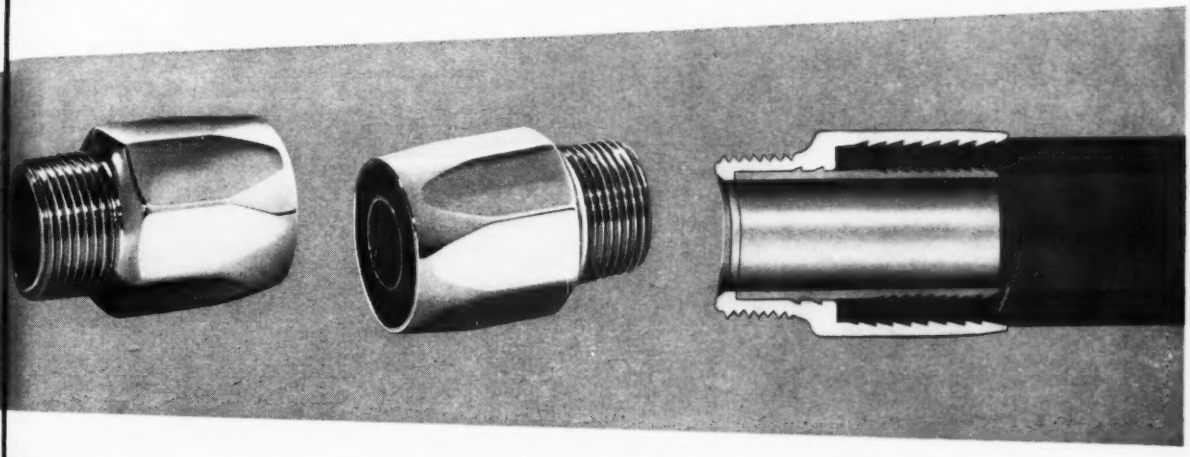
ALUMINUM COUPLING
for gasoline pump hose

Lighter in weight—one third the weight of brass permanently-attached couplings, the aluminum coupling costs less to handle and to ship.



The product of more than 5 years of Scovill research and engineering, this all-aluminum coupling for gasoline pump hose is identical in performance to brass in all respects. You can be sure of the same precision fit, full flow, leakproof safety, positive static connection and long life for which all Scovill permanently-attached couplings are recognized and respected—and **all at far less cost!** The saving is even more attractive when compared with reattachable-type couplings.

A special feature of the aluminum coupling is its highly polished surface—the perfect complement to modern gasoline pumps.

For more information on this high-performance, low-cost aluminum coupling, write to Scovill Manufacturing Company, Merchandise Division, 99 Mill Street, Waterbury 20, Conn.

Industrial Hose Couplings by **SCOVILL**

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New Year's resolutions are often hard to keep, but your resolution to use DCI Magnesias in *ALL* your neoprene stocks is one that you will find easy, pleasant and profitable to keep. If you haven't tried DCI Magnesias, write for literature and samples. Start your magnesia year right.

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Production of automobile weather stripping, at one midwest rubber company, had been seriously restricted by the need to remove carbon from aluminum molds. These special molds, supplied by customers in limited number, required 48 hours soaking time for carbon removal.

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The Curing Supervisor suddenly became a "most happy fella". The P.A. said, "This service means extra production, thousands of dollars worth." The Oakite man said, "That's what I'm here for."

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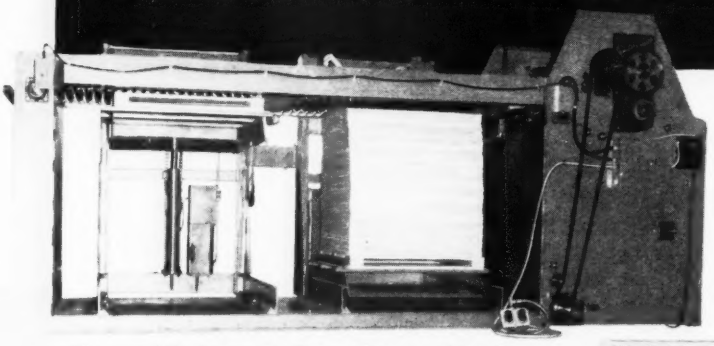
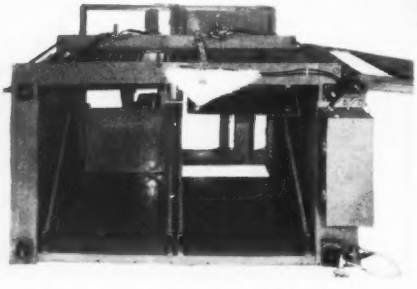
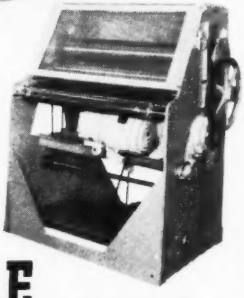




The new Alfa Automatic Rotary Cutter and Stacker offer production advantages never before attained:

- Production—up to and over 100 F/M.
- Material Widths—24" to 50".
- Length of Cut—24" to 60" adjustable.
- Machines readily synchronized to existing processing lines.
- These units will handle a wide range of materials and can be designed to meet the specific application.



- Stack Height-40" Load-4000 lbs/stack.
- Stacks are easily removed without interrupting continuous production.
- Fully Automatic Cutting and Stacking units furnished individually or as a fully self contained machine.

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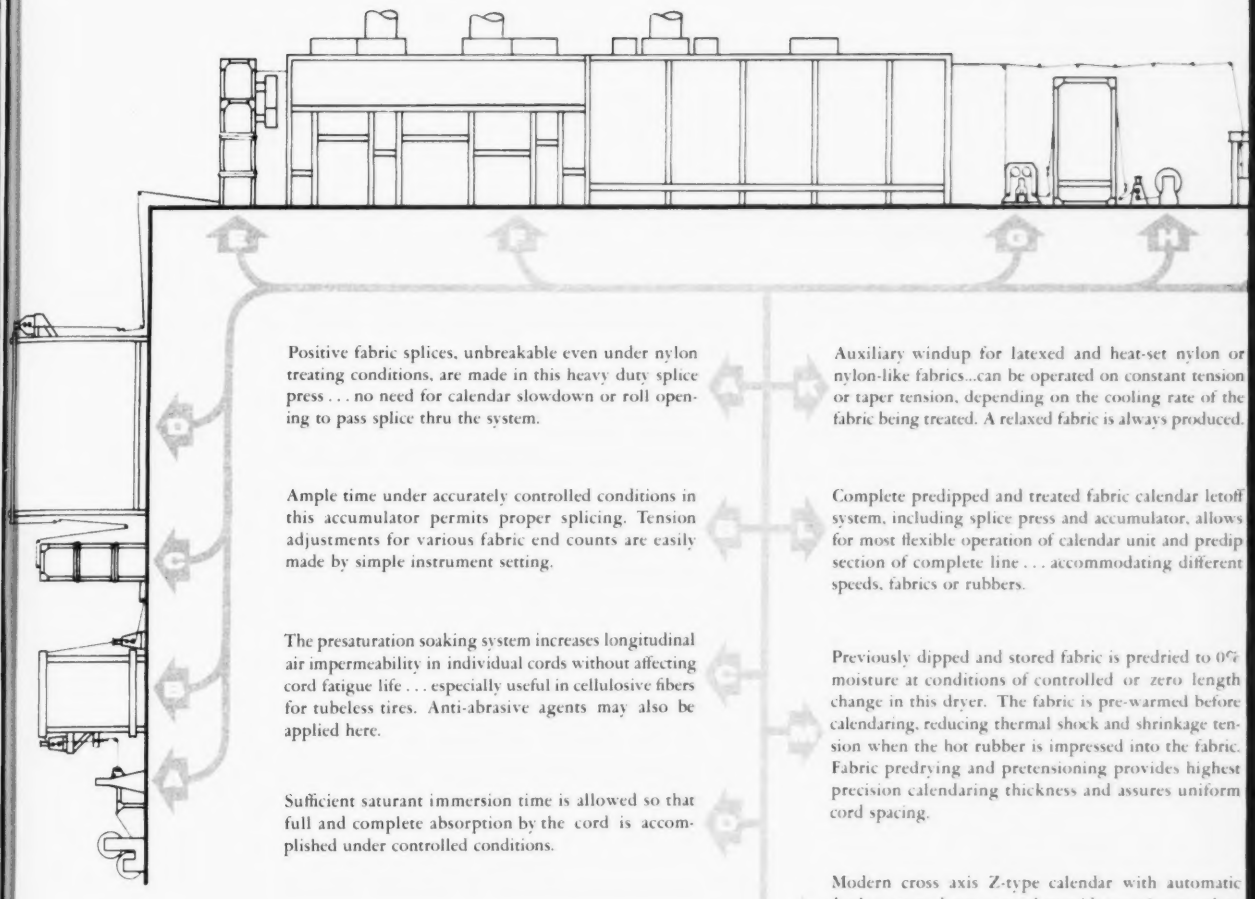


Positive fabric splices, unbreakable even under nylon treating conditions, are made in this heavy duty splice press . . . no need for calendar slowdown or roll opening to pass splice thru the system.

Ample time under accurately controlled conditions in this accumulator permits proper splicing. Tension adjustments for various fabric end counts are easily made by simple instrument setting.

The presaturation soaking system increases longitudinal air impermeability in individual cords without affecting cord fatigue life . . . especially useful in cellulosic fibers for tubeless tires. Anti-abrasive agents may also be applied here.

Sufficient saturant immersion time is allowed so that full and complete absorption by the cord is accomplished under controlled conditions.

The latex dipping systems handle all types of natural synthetic or Pyridine type dips. Excess solution is properly removed from the fabric in fluid state, assuring a very clean web and minimum dryer downtime for cleaning and housekeeping.

Convection drum or festoon type tension dryers for rayon, or predryers for nylon, remove dipping moisture from the fabric at proper drying rates and precise stretch or tension levels, with minimum cord displacement . . . pick cord alignment is unchanged, and high cord tensile strength assured.

Water-cooled or steam-heated capstan rolls propel the fabric smoothly, without damage to warp or weft. Low pressure T_1 inlet rolls hold fabric lightly and prevent self-abrasion of cords.

Constant tension windup for auxiliary batch-off of tension dried rayon fabric gives broad flexibility in the train operation. Unit can be operated separately either as a predip unit or as a complete calendar train.

Synchronously driven steam-heated rolls hold back nylon fabric without distortion under maximum hot stretching tensions. Heavy-wall roll design insures minimum deflection. No dancer roll inertia is present to distort fabric while in the plastic state.

Single, dual or triple hot stretch zones for nylon and nylon-like fabrics heat web by high impact velocity, constant time, two side heating along entire length. Exposure time, temperature and impact velocity are variable or fixed as required. Fabric is processed at constant stretch and in a fixed fabric path. Heating and cooling air are instantly available...no waiting for heavy rolls and tension elements to alter their position. Cooling on shutdown — and reheating after shutdown — is instantaneous.

Auxiliary windup for latexed and heat-set nylon or nylon-like fabrics...can be operated on constant tension or taper tension, depending on the cooling rate of the fabric being treated. A relaxed fabric is always produced.

Complete predipped and treated fabric calendar letoff system, including splice press and accumulator, allows for most flexible operation of calendar unit and predip section of complete line . . . accommodating different speeds, fabrics or rubbers.

Previously dipped and stored fabric is predried to 0% moisture at conditions of controlled or zero length change in this dryer. The fabric is pre-warmed before calendaring, reducing thermal shock and shrinkage tension when the hot rubber is impressed into the fabric. Fabric predrying and pretensioning provides highest precision calendaring thickness and assures uniform cord spacing.

Modern cross axis Z-type calendar with automatic duplex screw-down control provides maximum calendar speed and accuracy of rubber/fiber sandwich thickness. Balanced or unbalanced fabric cross section can be easily and accurately produced.

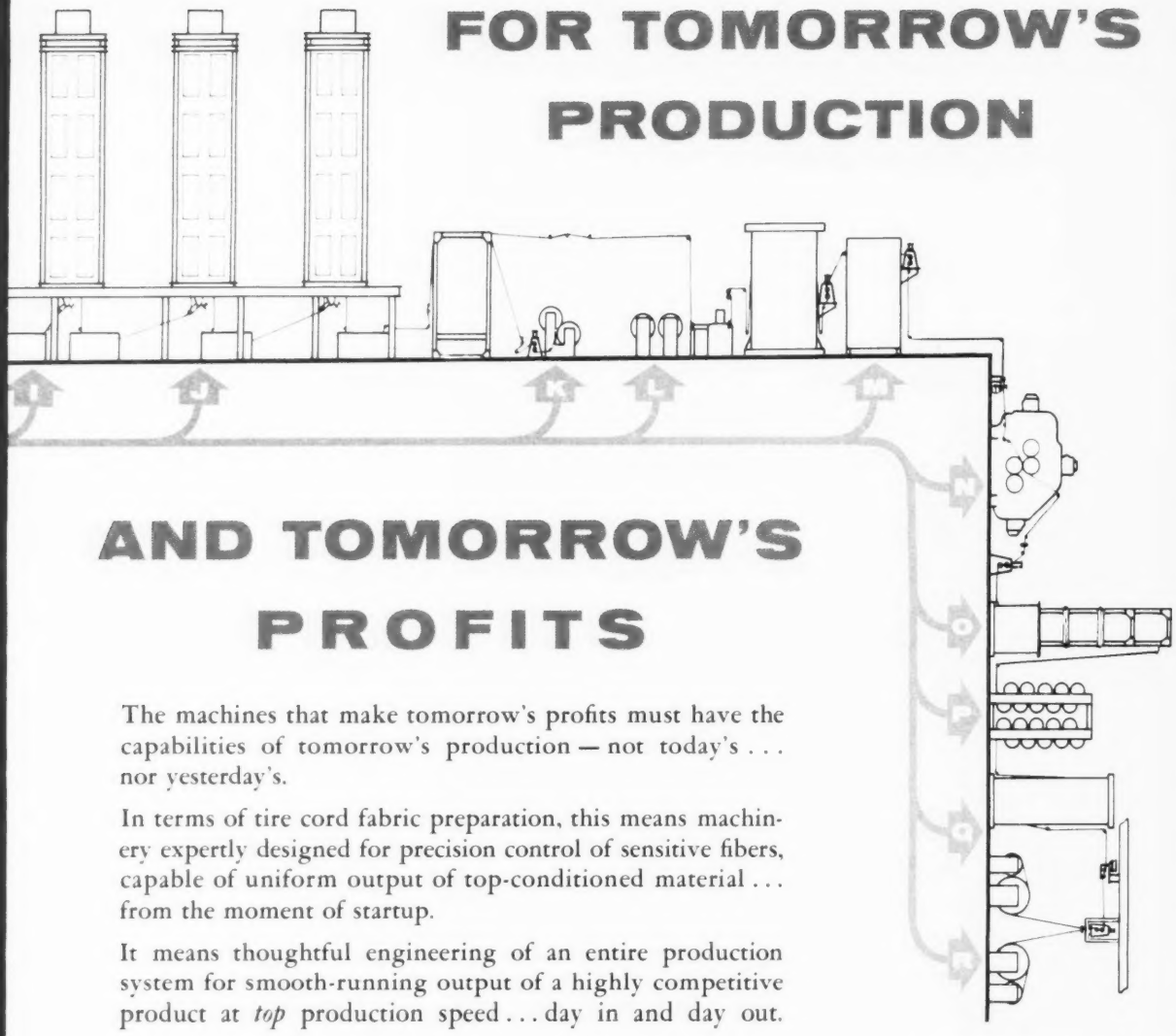
Uniform fabric tackiness reduces liner adhesion and increases speed of tire building . . . reduces scrap loss and down time at building machines and bias cutters . . . allows use of higher percentages of less expensive synthetic compound at the calendar.

Positive rubberized fabric cooling assured by adequate cooling drum capacity. Constant rate cooling under tension control assures uniform shrinkage and stabilized internal cord tension at fabric windup.

Expand/Aligner system at windup — as elsewhere in the system — assures uniform fabric and liner roll edge condition. Centering effect is accurate, and E/A does not stretch or split the fabric. Operates under low or high windup tensions.

Controlled tension windup allows for handling 54" diameter liner-and-fabric package. Liners can be vacuum cleaned and brushed in position if desired.

FOR TOMORROW'S PRODUCTION



AND TOMORROW'S PROFITS

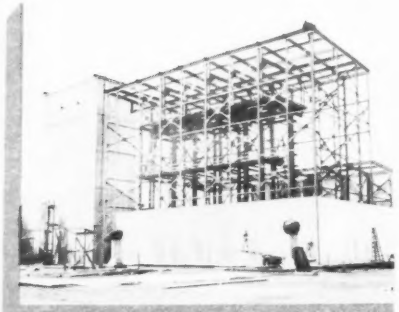
The machines that make tomorrow's profits must have the capabilities of tomorrow's production — not today's . . . nor yesterday's.

In terms of tire cord fabric preparation, this means machinery expertly designed for precision control of sensitive fibers, capable of uniform output of top-conditioned material . . . from the moment of startup.

It means thoughtful engineering of an entire production system for smooth-running output of a highly competitive product at *top* production speed . . . day in and day out.

It means design by an informed group of forward-thinking engineers, so that the entire production system has built-in versatility to handle future advances, with a minimum of adaptation.

The complete 300-foot multi-zone rayon/nylon line sketched on these pages is an example of one of today's installations for tomorrow's profits. Some eighty such systems — large, medium and small, installed and abuilding across the world— attest to the efficiency of Litzler design for the high speed production of very precisely conditioned material.



Resourceful engineering makes way for tomorrow's equipment in today's plant. Here treatment towers push their way through the roof in the world's first triple-zone installation, currently being completed.

C. A. LITZLER CO., INC.

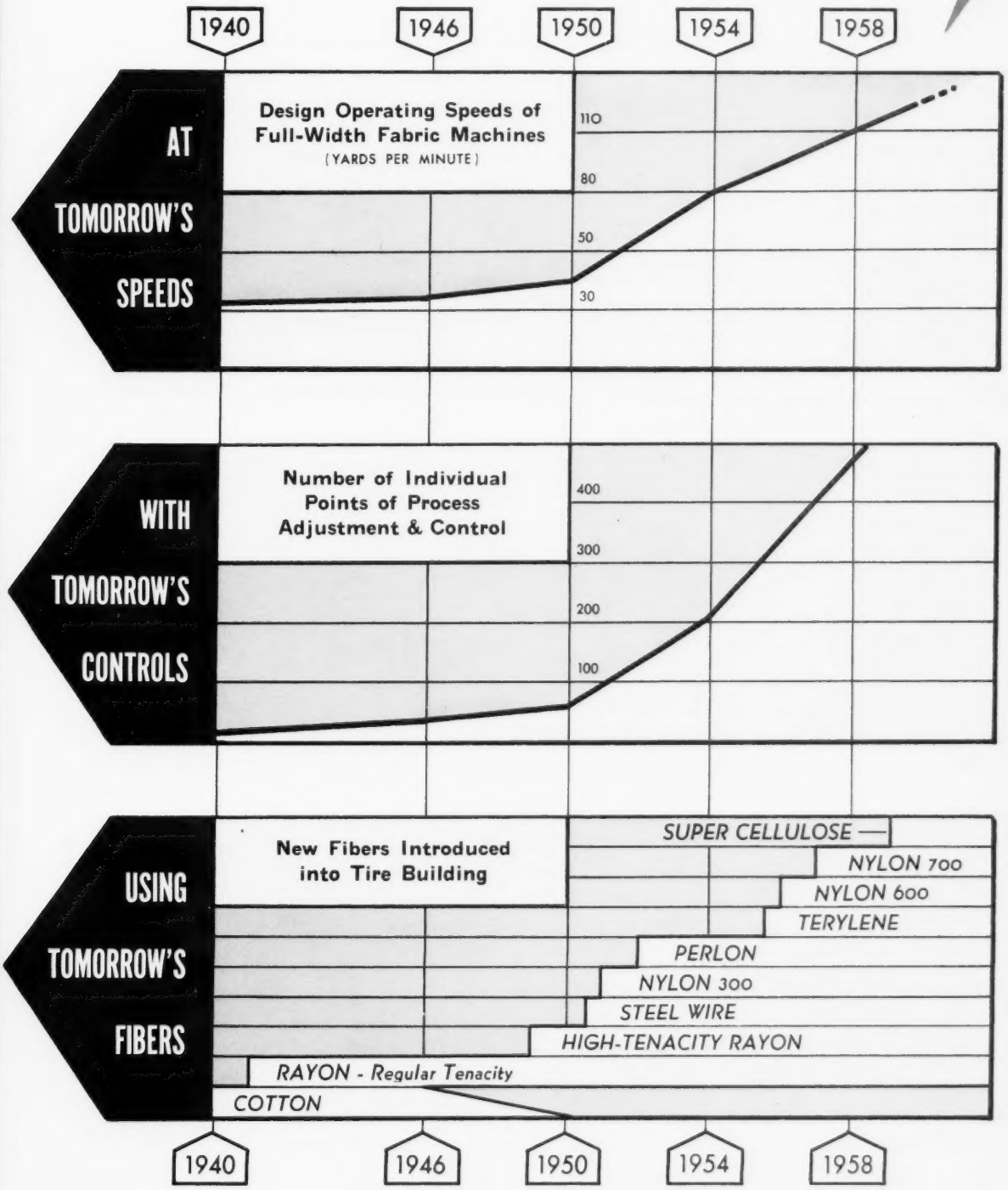
ENGINEERS & BUILDERS OF PACE SETTING SYSTEMS

1817 BROOKPARK RD. **CLEVELAND 9, OHIO** CABLE "CALITZ"

EXPORT REPRESENTATIVE: GILLESPIE & CO. OF N. Y., 96 WALL ST., NEW YORK 5, N. Y.

LICENSED EUROPEAN FABRICATORS IN ENGLAND, GERMANY AND FRANCE

ADVANCED TIRE CORD PROCESSING



C. A. LITZLER CO., INC. CLEVELAND 9, OHIO

Plasticizer Data

TO HELP YOU CHOOSE THE RIGHT PLASTICIZER

these Harflex® Plasticizers are efficient

Dibenzyl Sebacate

Permanence • Flexibility over wide temperature range • Low volatility • Good electrical properties

Appearance	Clear Liquid or White Solid
Color, APHA	100 max.
Odor	Mild
Specific Gravity 30/20°C.	1.055±0.003
Free Acidity, as Acetic Acid	1.10% max.
Ester Content	99.0% min.

Major uses:

A plasticizer in polyvinyl resins and copolymers, polyvinyl butyral and butadiene—acrylonitrile rubbers.

Dimethyl Sebacate

Extreme efficiency • Excellent low temperature properties

Appearance	Clear Liquid or White Solid
Color, APHA	100 max.
Odor	Neutral
Specific Gravity 30/20°C.	0.986±0.003
Free Acidity, as Acetic Acid	0.02 max.
Ester Content	99.0% min.

Major uses:

A plasticizer in vinyl resins, synthetic rubbers, cellulose nitrate, cellulose acetobutyrate, acrylic resins; as a chemical intermediate, and a neutral, concentrated source of the sebacyl radical.

HARCHEM produces a full line of phthalate, adipate, sebacate and polymeric plasticizers in addition to the plasticizers shown.

The Harchem Division laboratories will gladly assist you with your plasticizer problems, or will supply additional data including formulation test results and formulation suggestions for any Harflex Plasticizer.

Address inquiries to Dept. H-40R

SEBACATES
PHTHALATES
ADIPATES

THE KEY TO HARCHEM® BETTER PLASTICS

Columbian Carbon Company, Distributor To The Rubber Industry

HARCHEM DIVISION

WALLACE & TIERNAN, INC.
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY
IN CANADA W. C. HARDESTY CO. OF CANADA, LTD., TORONTO

NEW RUBBER SOLVENT INCREASES PRODUCTION WITH SHORTER DRYING TIME!

ESPESOL 165's Narrow boiling range reduces handling time — improves quality of end product!

NEW ESPESOL 165 aliphatic solvent offers rubber processors a *narrow boiling range of 165 to 225 degrees F* with a low-odor factor. This narrow cut with its low end point offers a much shorter drying time and a substantial increase in production.

ESPESOL 165's higher initial boiling point offers less evaporation loss and permits greater solvent recovery. The solvent's unusually short distillation range offers two additional benefits: 1. Improved quality of end products. 2. Reduction in amount of solvent used.

Because the use of ESPESOL 165 can reduce handling time, increase production and improve the quality of your end products, this outstanding new solvent deserves the consideration of your organization. Send for the complete ESPESOL 165 story. Brochure containing characteristics and properties yours free on request. (No delivery problems! Eastern maintains adequate stocks of this unique product at all times.)

EASTERN STATES PETROLEUM & CHEMICAL *Corporation*

(Formerly Eastern States Chemical Corporation)
P. O. Box 5008 • Houston 12, Texas • Phone WAlnut 3-1651
Chicago Office: 1011 Lake Street, Oak Park, Ill., Phone Village 8-5410
New York Office: 10 Rockefeller Plaza, New York, N.Y., Phone Circle 7-2520

ESPECO

Eastern States Petroleum & Chemical Corporation
P. O. Box 5008. Dept. RW 1-8. Houston 12, Texas

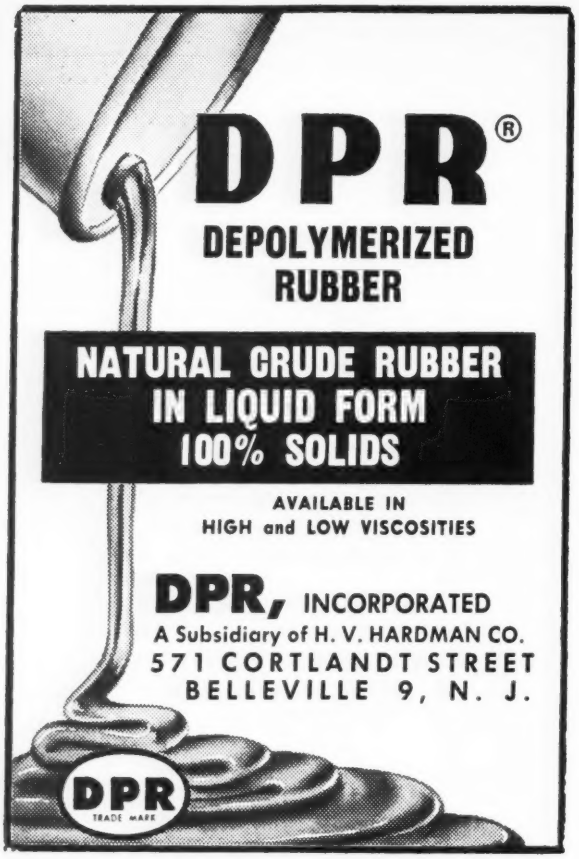
Please send me free booklet on the characteristics and properties of Espesol 165.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ **ZONE** _____ **STATE** _____



DPR®

DEPOLYMERIZED RUBBER

NATURAL CRUDE RUBBER IN LIQUID FORM 100% SOLIDS

AVAILABLE IN HIGH and LOW VISCOSITIES

DPR, INCORPORATED
A Subsidiary of H. V. HARDMAN CO.
571 CORTLANDT STREET
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DPR TRADE MARK

CROWN CLAY

SOUTHEASTERN CLAY CO.
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THE PIGMENT & CHEMICAL CO., LTD.	Toronto and Montreal

double check exactly what you want in a Rubber Holland!

HOLLISTON

BRATEX

RUBBER HOLLAND

meets every requirement

- Bratex is lastingly pliable under all conditions
- Bratex is clean peeling to save time and work
- Bratex retains its outstanding surface gloss
- Bratex is non-flaking and easier to use
- Bratex is always of uniform caliper
- Bratex works equally well for hot or cold processing
- Bratex comes in three standard qualities
- Bratex is available in 20" and 40" widths
- Bratex comes in 100 and 250 yard rolls
- Bratex can be made up in special size rolls

THE HOLLISTON MILLS, INC., NORWOOD, MASS.
NEW YORK • PHILADELPHIA • CHICAGO • MILWAUKEE • SAN FRANCISCO

Have you tried . . .

'Sharples' brand

Ethylac® as an Activator

. . . for faster cure without marked effect on scorch time

'Sharples' brand ETHYLAC . . . widely used as a primary accelerator . . . has now shown outstanding characteristics as a delayed action activator. Here are the results of a study based on a general purpose, intermediate modulus, high quality compound . . . a type usually accelerated with a thiazole accelerator. ETHYLAC was added at two levels as an activator.

MBTS Activated with ETHYLAC

Compound	1	2	3
Smoked Sheet Blend	100.0	100.0	100.0
HAF Black	50.0	50.0	50.0
Zinc Oxide	5.0	5.0	5.0
Stearic Acid	3.0	3.0	3.0
Pine Tar	3.0	3.0	3.0
Antioxidant	1.0	1.0	1.0
Sulfur	2.25	2.25	2.25
MBTS	1.0	1.0	1.0
ETHYLAC	0.0	0.4	0.8
Total	165.25	165.65	166.05

Mooney Scorch

T-5 @ 248°F.	18.0	19.5	17.9
T-5 @ 266°F.	10.3	10.6	10.3

Cure—Min. @ 284°F.	M300	T	E	H	M300	T	E	H	M300	T	E	H
10	1225	3275	610	57	1800	3700	600	61	1825	3900	600	65
20	1725	3825	600	65	2625	3450	410	74	2900	3675	400	75
30	2025	3825	530	68	2900	3425	380	75	3025	3200	320	76
40	2100	3975	530	66	3100	3400	350	73	3150	3150	300	77

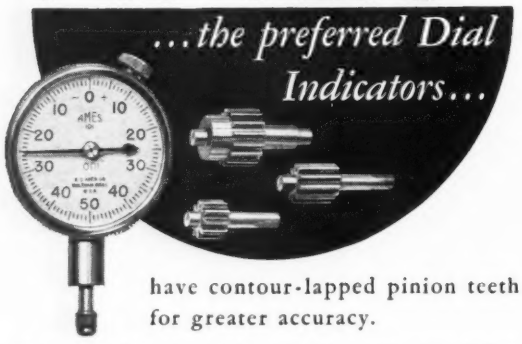
Write for your copy of our Technical Bulletin S-130 on ETHYLAC as an activator. It contains data on MBTS, DIPAC® and other thiazole type accelerators activated with ETHYLAC.

See our Catalog in CMC.

INDUSTRIAL DIVISION
PENNSALT CHEMICALS CORPORATION
3 Penn Center, Philadelphia 2, Pa.
Regional Offices:
Akron • Chicago • Detroit • New York • Philadelphia • Pittsburgh • St. Louis
Representatives:
Martin Hoyt & Milne, San Francisco and Los Angeles
Airco Company International, New York
Pennsalt Chemicals of Canada Ltd., Hamilton, Ontario

Pennsalt Chemicals
ESTABLISHED 1850

AMES



have contour-lapped pinion teeth for greater accuracy.

Because tooth form determines how well pinions mesh — Ames hardens, contour laps, and carefully inspects pinions for perfect tooth form and finish. The result: Pinions that mesh perfectly and a complete absence of "play". This extra attention to detail is typical of the Ames manufacturing approach. It helps explain why so many companies specify Ames Dial Indicators as "preferred". Write today for complete information.

Representatives in principal cities

B.C. AMES CO.

59 Ames Street, Waltham 54, Mass.

MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

You make them
We road test them

On the most natural Proving Grounds in America—South Texas

This independent test fleet is located in Devine, Texas, some thirty-two miles southwest of San Antonio on U S Hiway 81. Sponsors have a choice of three routes from which to choose. Test procedures are flexible. Tire rotation, cycle miles, number and frequency of reports or routing, can be a basis for discussion if the sponsor so desires. We endeavor to operate to the best advantage of the sponsor. Because we are wholly independent of any organization, all information collected is responsible to the sponsor only.

Tires of all specifications tested—both passenger car and truck. Your inquiries will receive prompt attention.

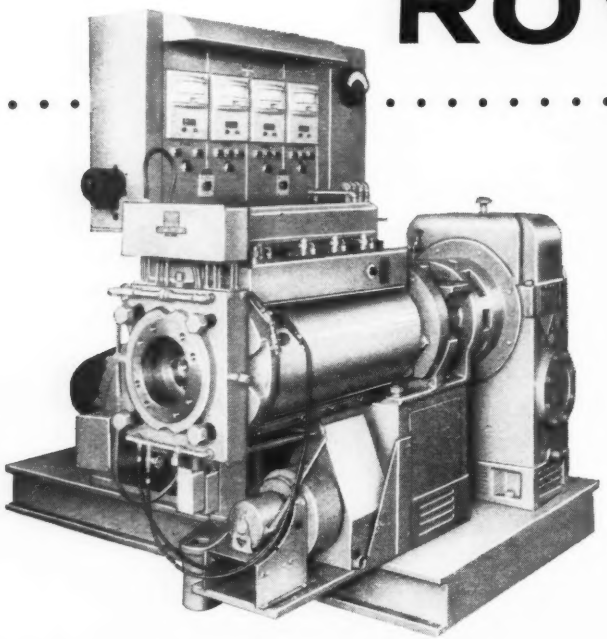
SOUTH TEXAS TIRE TEST FLEET, Inc.

Phone Morris 3-4428 **DEVINE, TEXAS** P. O. Box 353

A. J. (AL) Morrow, Pres. & Gen. Mgr.

ROYLE

SPIROD® EXTRUDERS



These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

Write for Bulletin #463

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England	Home Office	Akron, Ohio	Downey, Cal.	Tokyo, Japan
James Day (Machinery) Ltd.	V. M. Hovey J. W. VanRiper	J. C. Clinefelter Co.	H. M. Royal, Inc.	Okura Trading Co., Ltd.
Hyde Park 2430 - 0456	SHerwood 2-8262	BLackstone 3-9222	TOpaz 1-0371	(56) 2130 - 2149

BRUTH-ERR...If you want a spanking good Color, take a tip from me!
– But, of course, we mean color that has permanence and brightness for product appeal . . .

STAN-TONE COLORS

For Every Rubber and Plastic Requirement . . .

***STAN-TONE MBS** – Masterbatch
Color dispersed and standardized in intensity for precision matching. It assures exact duplication of color in compounds and cleaner compounding.

***STAN-TONE PEC** – Polyester paste colors. Pigments selected for maximum heat and light stability. Custom matched to color requirements, in polyester resin.

***STAN-TONE Paste** – Color dispersed in plasticizer for use with vinyl resins.

***STAN-TONE GPE** – Color dispersed in polyethylene.

***STAN-TONE Dry Colors —**
All colors in powder form for all purposes.

*STAN-TONE registered U. S. Pat. Office.

Plasticizers and Softeners For All Resins and Rubbers . . .

*POLYCIZER DBS – (Dibutyl Sebacate)
*POLYCIZER DBP – (Dibutyl Phthalate)
*POLYCIZER 162 – (Dioctyl Phthalate)
*POLYCIZER 332 – (Dioctyl Adipate)
*POLYCIZER 532 – (Octyl Decyl Adipate)
*POLYCIZER 562 – (Octyl Decyl Phthalate)
*POLYCIZER 632 – (Didecyl Adipate)
*POLYCIZER 662 – (Didecyl Phthalate)
*POLYCIZER 662-BPA – (Electrical grade of 662)
*POLYCIZER BO – (Butyl Oleate)
*CELLUFLEX 179C – (Tricresyl Phosphate)
*CELLUFLEX 112 – (Diphenyl Cresyl Phosphate)

PLASTICIZER ODN . . . Very effective softener for acrylonitrile rubbers.
PLASTICIZER SC . . . Good low-temperature plasticizer.

*Registered U. S. Patent Office.

1932 25 1957
25 YEARS OF SERVICE
HARWICK STANDARD CHEMICAL CO.

Write for complete data

HARWICK STANDARD CHEMICAL CO.

60 SOUTH SEIBERLING STREET, AKRON 5, OHIO

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CHICAGO 25, ILLINOIS 2724 W. LAWRENCE AVE.
LOS ANGELES 21, CALIF. 1248 WHOLESALE STREET
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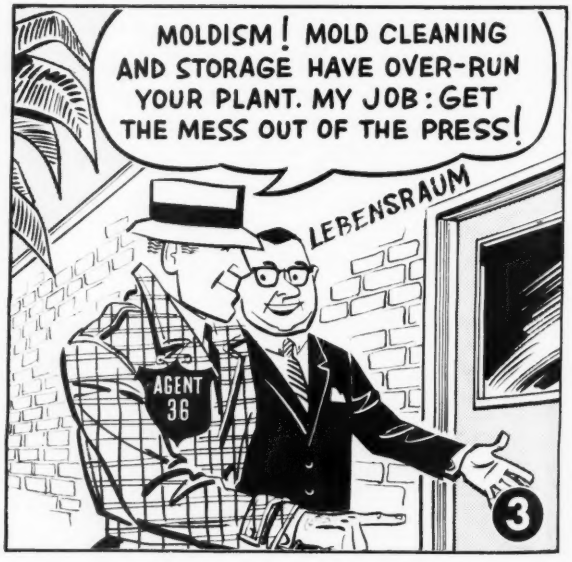
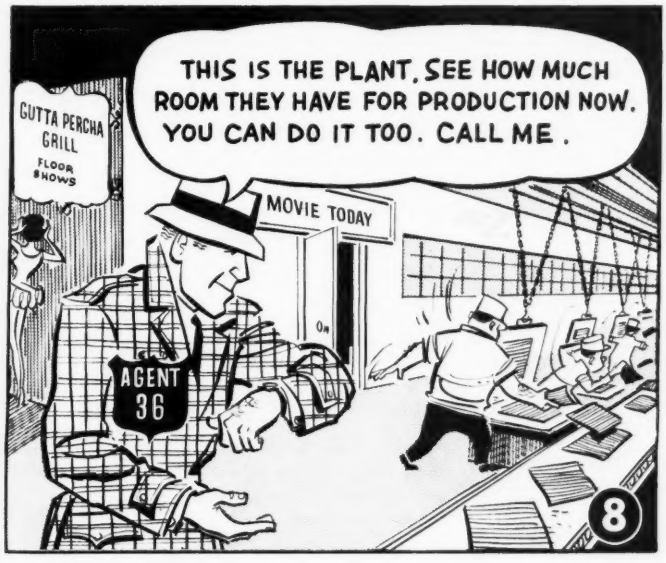
AGENT 36
SILICONE SQUAD

"HOW I SOLVED AN INSIDE JOB"

FROM THE OFFICIAL FILES OF DOW CORNING



DOW CORNING 36 EMULSION CUTS MOLD MAINTENANCE, GIVES QUICK RELEASE, REDUCES SCRAP, SPEEDS PRODUCTION.
YOU'RE PERFECT, 36.
AGENT 36
7


THIS IS THE PLANT. SEE HOW MUCH ROOM THEY HAVE FOR PRODUCTION NOW. YOU CAN DO IT TOO. CALL ME.
GUTTA PERCHA GRILL
FLOOR SHOWS
MOVIE TODAY
AGENT 36
8

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

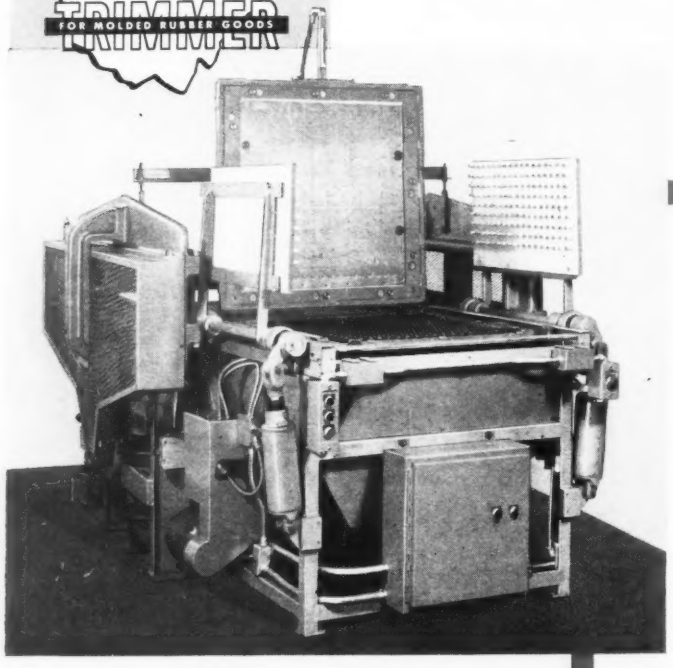
ATLANTA BOSTON CHICAGO CLEVELAND DALLAS
DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C.

CHECK these 5 examples!

YOU CAN SAVE TIME AND MONEY

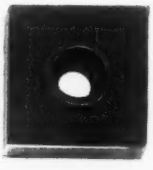
. . when trimming molded rubber goods on FEMCO'S Automatic TRIMMER!

FEMCO AUTOMATIC TRIMMER FOR MOLDED RUBBER GOODS



✓ 121 Cavity 2¼" Dia.
MOTOR MOUNT
5,000 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $460

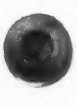
✓ 121 Cavity 2⅛" Sq.
MOUNTING BLOCK
6,500 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $725



✓ 81 Cavity
TOY TIRES
4,500 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $325

✓ 14 Cavity
COIL SPRING WASHER
1,500 Pieces Per Hr.
Two Level Cutting
(Approx. Production)
Die Cost Approx. $330

✓ ¾" Dia. 110 Cavity
CUSHION DOOR STOP
13,000 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $100

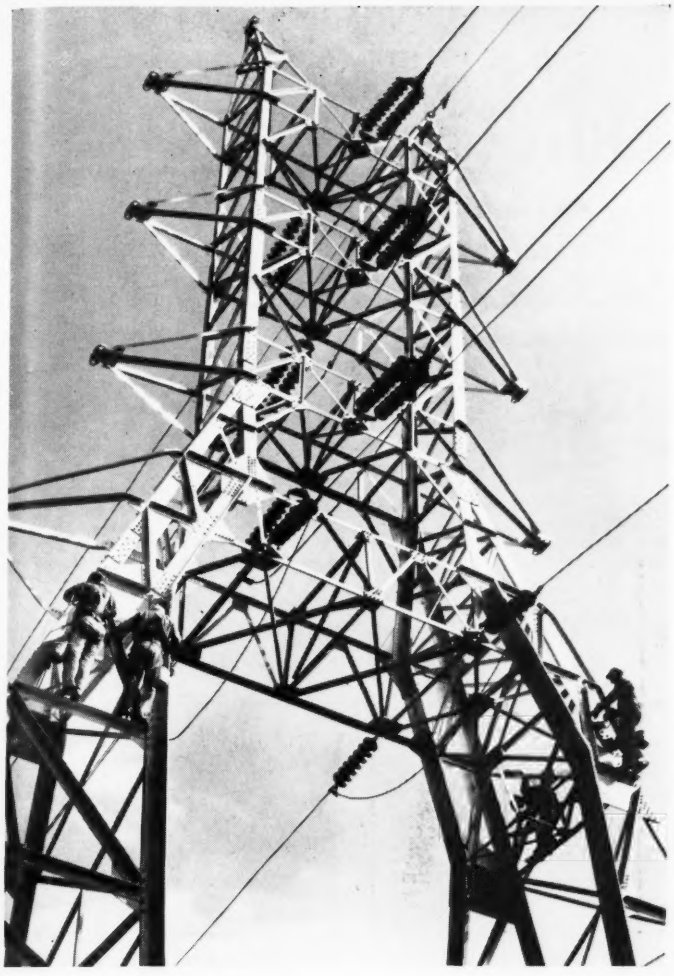


HERE are five more examples of how FEMCO's New Automatic Trimmer for Molded Rubber goods turns production losses into profits! Now high speed trimming production hour after hour is yours in an operation that takes practically all the manual work out of the job! Write, wire or call us, let us tell you how we can help you solve your particular trimming cost problem. Ask to see a film of this machine in action.

1917 40th ANNIVERSARY 1957

The FALLS ENGINEERING AND MACHINE CO.
CUYAHOGA FALLS, O.

FEMCO builds special machines for cutting, trimming, splitting all the new plastics and foams, including urethanes. Write for details, tell us what you need.



HIGH POWER

production

for Fast and Smooth Extrusion of Electrical Insulation and Jacketing Compounds!

Marbon "8000-AE"®

REINFORCING HIGH STYRENE RESIN

The Superior Electrical Grade Resin!

- **SUPERIOR ELECTRICAL PROPERTIES**
- **LESS SCORCH**
- **INCREASED TOUGHNESS**
- **GREATER TEAR-RESISTANCE**

America's foremost electrical insulation suppliers have demonstrated the complete dependability of Marbon 8000-AE for fast mixing; smooth, easy extrusion and shrink-free calendering of electrical insulations, jackets and sheet stock. Marbon 8000-AE has proved time and again to be the superior electrical grade resin because it has all the reinforcing properties of world-famous Marbon 8000-A.

Get the Facts . . .

Write **TODAY** for complete TECHNICAL LITERATURE

MARBON CHEMICAL
Division of BORG-WARNER
GARY, INDIANA

MARBON . . . It BLENDS as STRENGTHENS as it IMPROVES

TEXUS SYNPOL

BUTADIENE-STYRENE SYNTHETIC RUBBERS

SYNPOL	HOT TYPES							
	1000	1001	1002	1006	1007	1009	1012	1013
DESCRIPTION								
Emulsifier Stabilizer	Fatty Acid Staining	Fatty Acid Slightly Staining	Rosin Acid Staining	Fatty Acid Non-Staining Non-Discoloring	Fatty Acid Staining	Fatty Acid Non-Staining Non-Discoloring Divinylbenzene Terpolymer	Fatty Acid Non-Staining Non-Discoloring	Fatty Acid Non-Staining Non-Discolor Gum Coagul High styrene
Miscellaneous					Glue Acid coagulated			
SPECIFICATIONS								
CHEMICAL								
Volatile Matter (Max.)	0.50	0.50	0.50	0.50	0.50	0.75	0.50	1.00
Ash (Max.)	1.50	1.50	1.50	1.50	0.50	1.50	1.50	1.25
Organic Acid	4.00–6.25	4.00–6.25	3.75–6.00	3.75–6.00	3.75–6.00	3.75–6.00	4.25–6.50	4.00–6.0
Soap (Max.)	0.75	0.75	0.75	0.75	0.25	0.75	0.50	0.01
Bound Styrene	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	42.0–44
Stabilizer	1.00–1.75	1.00–1.75	1.00–1.75	1.25 added	1.00–1.75	1.25 added	1.25 added	1.25 add
PHYSICAL								
Raw Viscosity	44–52	44–52	50–58	46–54	45–55		95–115	40–50
Cpd. Viscosity (Max.)	73	73	65	73	73	115–135	120	73
Tensile psi (Min.)	2700	2500	2700	2500	2400	1600	2900	2500
Elongation % (Min.)	550	500	550	500	500	300	450	600
=Modulus psi 25′	300–600	325–625	300–600	400–700	450–750	400–700**	550–1000	750–750
=Modulus psi 50′	800–1150	750–1100	750–1100	825–1175	775–1125	600–950**	1200–1700	1775–117
=Modulus psi 100′	1250–1650	1200–1600	1125–1525	1300–1700	1125–1525	850–1250**	1750–2250	2250–17
Water Soluble Ash % (Max.)					0.35			
Water Absorption mg./sq. cm. (Max.)					1.50			
Shrinkage % (Max.)						25.0		
Oil—Parts								
Oil—Type								
REMARKS	A general purpose hot rubber adaptable to most black products where color is unimportant.	More resistant to staining and discoloring than 1002.	Higher tensile and lower modulus incured compounds than 1000 or 1001. Slower curing.	General purpose, non-discoloring and non-staining polymer.	Glue acid coagulated staining polymer with relatively low water absorption, low ash, and good electrical properties.	A non-staining cross linked polymer. Use of small quantities with other type polymers reduces shrinkage and die-swell in calender and extrusion operations.	A high-Mooney polymer for solution applications.	High styre non-staining non-discolor polymer.
APPLICATIONS	Tires, molded and extruded mechanical goods and any other general purpose application.	Tires, molded and extruded mechanical goods, shoe soles & heels.	Tires, molded and extruded mechanical goods.	Light colored and white products, such as white sidewall tires, shoe soles, floor tile and toys.	Wire and cable insulation, electrical tape, gaskets, hard rubber products, etc.	Wherever control of shrinkage is important. Footwear, wire and cable insulations, calendered sheet goods, soles and heels. Can be used with Natural Rubber and Neoprene.	Asbestos sheet packing.	Calendered goods, clos tion sealant adhesives.

PRE-TESTED COMPOUNDING FORMULAS FOR SYNPOL 1708

Actual cost-tested compound formulas for Molded Soles, Code Wire Insulation, Floor Tile, and other products are included in this New SYNPOL 1708 Bulletin.

This is the first in a series of Technical Bulletins offering comprehensive data covering descriptions and specifications, physical properties, typical production values, and specific product applications for TEXUS SYNPOLS. For your free copy, contact your local TEXUS representative or Naugatuck Chemical, Naugatuck, Conn.—SYNPOL Sales Agent.

†Based on rubber hydrocarbon content

=300% Elongation

**Synpol 1009 Moduli @ 200% Elongation

SYNPOL—Texas-U. S. Chemical Company's brand name for Butadiene-Styrene copolymers is one you can depend on for synthetic rubber of the highest quality and uniformity.

TEXUS SYNPOLS conforming to original GR-S specifications have numbers corresponding to the earlier GR-S types, even though in many cases improvements in color, uniformity, etc., have been made. SYNPOLS which incorporate the latest advances in polymer chemistry and technology, resulting in entirely new types which are finding ever increasing product applications, are designated by new numbers.

TEXUS SYNPOLS offer you the widest selection of clear polymers in the industry; plus the availability of your rubber needs from strategically located warehouses.

NEW IMPROVED SYNPOLS*

These light-colored, oil-extended polymers are made possible by the development of a new, non-volatile pale naphthenic oil, used exclusively in TEXUS SYNPOLS. For the first time, the advantages of light color and fast, high-temperature processing have been combined! And the light color is retained in the vulcanizates even after extreme and prolonged exposure to sunlight and heat.

In addition to their economical use in current products, the outstanding characteristics of the new 1703, 1707 and 1708 SYNPOLS offer exciting possibilities for new product development.

TEXUS Technical Service is always ready to assist you on any product or processing problems, and complete SYNPOL technical data will be sent promptly upon request.

	COLD TYPES					COLD OIL-EXTENDED TYPES				
12	1013	1061	1500	1502	1551	1703*	1707*	1708*	1711	1712
id ining coloring	tty Acid n-Staining n-Discoloring m Coagulated h styrene	Fatty Acid Non-Staining Non-Discoloring	Rosin Acid Staining	Mixed Soap Non-Staining Non-Discoloring	Rosin Acid Non-Staining Non-Discoloring	Mixed Soap Non-Staining Non-Discoloring	Rosin Acid Non-Staining Non-Discoloring	Potassium Fatty Acid Non-Staining Non-Discoloring	Rosin Acid Staining	Mixed Soap Staining
-6.50 -24.5 added	1.00 1.25 4.00–6.00 0.01 42.0–44.0 1.25 added	0.50 1.50 4.00–6.25 0.75 22.5–24.5 1.25 added	0.75 1.50 5.00–7.25 0.50 22.5–24.5 1.00–1.75	0.75 1.50 4.75–7.00 0.50 22.5–24.5 1.25 added	0.75 1.50 5.00–7.25 0.50 22.5–24.5 1.25 added	0.75 1.50 4.50–6.30 0.50 22.5–24.5 1.25 added†	0.75 1.50 3.90–5.70 0.50 22.5–24.5 1.25 added†	0.75 0.50 3.90–5.70 0.50 22.5–24.5 1.25 added†	0.75 1.50 3.90–5.70 0.50 22.5–24.5 1.25 added†	0.75 1.50 3.90–5.70 0.50 22.5–24.5 1.25 added†
5 000 1700 2250	40–50 73 2500 600 350–750 775–1175 1250–1750	44–52 73 2500 500 325–625 750–1100 1200–1600	46–58 73 3800 600 300–650 800–1200 1200–1700	46–58 73 3100 575 350–650 775–1125 1250–1650	46–58 73 3600 600 300–650 800–1200 1200–1700	50–70 25 Naphthenic	45–65 37.5 Naphthenic	50–70 0.35 1.50 37.5 Naphthenic	45–65 37.5 Highly Aromatic	45–65 37.5 Highly Aromatic
oney or ns.	high styrene, on-staining and on-discoloring ymer.	Similar to 1006, with Polygard stabilizer.	A general purpose cold rubber for use where color and staining is unimportant.	Non-discoloring and non-staining cold rubber. Higher physicals than 1006 and 1061	A general purpose non-staining and non-discoloring cold rubber, based on recipe for 1500	A general purpose non-discoloring, non-staining oil-extended polymer.	Similar to 1703. Emulsified with rosin soap rather than mixed soap.	Non-discoloring and non-staining polymer, low ash content and water absorption values, resulting in good electrical properties.	Similar to 1712, emulsified with rosin soap rather than mixed soap.	General purpose oil-extended polymer for use where color and staining is unimportant.
heet	Rendered rods, closures, on sealants, esives.	Light colored and white products such as white sidewall tires, shoe soles, floor tile and toys.	Tires, camelback, molded and extruded mechanical goods.	For light colored and white products such as white sidewall tires, white and light colored mechanical goods, floor tile, hospital sheeting, toys, soles and heels.	For general use where non-staining characteristics are important.	Competitive grade for light colored and white products, tires, mechanical goods, floor tile, shoe soles and heels.	Tires, camelback, heels, molded and extruded mechanical goods.	Competitive grade for wire and cable insulation; certain electrical goods, coated fabrics, molded and extruded mechanical goods, soles and heels.	Tires and camelback.	Tires, camelback molded and extruded mechanical goods.

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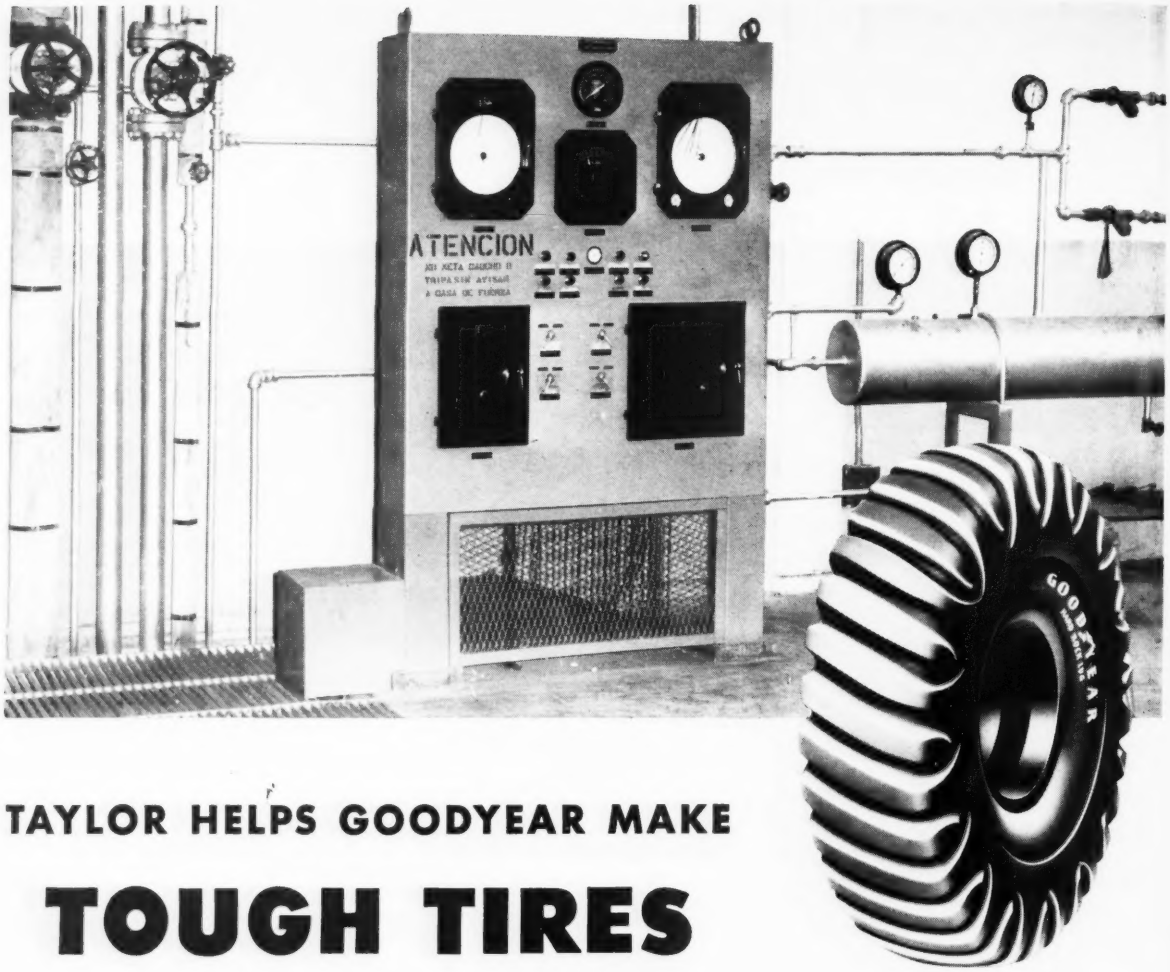

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TOUGH TIRES

for Venezuelan trucks and tractors!

Here's the "nerve center" of the Taylor Control System for Goodyear's 120" pot heater in their new tire plant in Valencia, Venezuela. Plant officials of Goodyear Tire & Rubber S.A. report that this precision control makes possible the production of truck and tractor tires that *stay rugged over a long tire life.*

A Taylor FULSCOPE* Temperature Controller regulates the temperature. The complete cure is precision-timed by two Taylor FLEX-O-TIMER* Time Cycle Controllers—a sequence timer for a range from 2 to 192 minutes and a cure timer with a range from 18 to 1,440 minutes.

This fully automatic timing means:

1. Improved tire quality—the automatic cure cycles *are uniform.*

2. Improved plant efficiency—automatic cure timing permits *closer scheduling of heats*, reduces idle time of equipment and operators.

3. Reduced processing costs—there's *no need for a "steam-tender"* to time curing stages.

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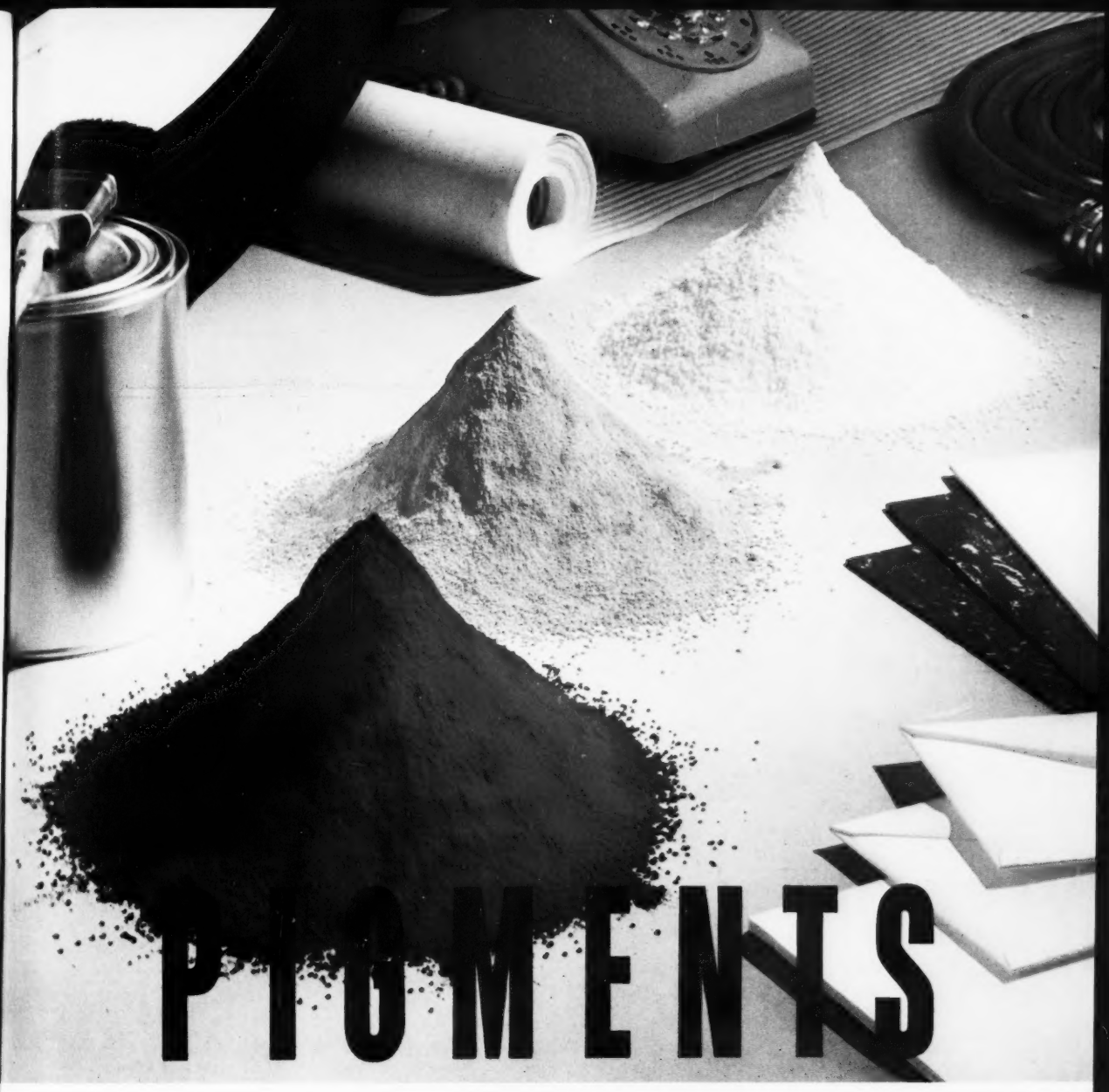

Why best-selling rubber products of tomorrow begin with Glidden pigments today

In an increasingly competitive market, the top-quality products you produce—and *sell*—must appeal with every color advantage possible.

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Glidden pigments fulfill all of these requirements. Glidden *Zopaque* Titanium Dioxide is the whitest white pigment available. New *Mercadmolith* (mercury-cadmium) and *Cadmolith* (cadmium-selenium) colors offer a combination of advantages found in no other reds and yellows. They are soft, easy to grind; insoluble in all vehicles; high in heat resistance.

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Goodrich-Gulf Chemicals, Inc.

Ameripol... COLD POLYMERS

Types	Physical Properties*		Selection Guide
1500	Tensile	4240 psi.	General purpose rubber where color is unimportant. For tires, molded and extruded products.
	Elongation	610%	
	Modulus @ 300% Elongation	890 psi.	
	Mooney Viscosity—		
	ML212°F @ 4 minutes		
	Raw Polymer	52	
	Compounded Stock	61	
1501	Tensile	4240 psi.	Used in the same general type of products as Ameripol 1500. This polymer should be used where severe staining and discoloration must be avoided while retaining good aging characteristics.
	Elongation	685 %	
	Modulus @ 300% Elongation	1000 psi.	
	Mooney Viscosity—		
	ML212°F @ 4 minutes		
	Raw Polymer	52	
	Compounded Stock	61	
1502	Tensile	3860 psi.	An improved, lighter colored rubber, relatively non-discoloring and non-staining. For white and pastel colored mechanical goods, floor tile, toys, sheeting, etc.
	Elongation	715 %	
	Modulus @ 300% Elongation	825 psi.	
	Mooney Viscosity—		
	ML212°F @ 4 minutes		
	Raw Polymer	53	
	Compounded Stock	67	

*Typical average production values. Cure 50′ at 292°F.

Choose cold polymer man-made rubber for superior flexing, wear, abrasion resistance

Ameripol is the preferred butadiene-styrene rubber—superior or equal to natural rubber in aging, resistance to wear, weathering, water, oil, permeability to gases.

Of the many types of Ameripol rubber, the cold polymer grades offer the best physical properties where exceptional flexing and loading are involved, and exceptional wear and abrasion resistance required.

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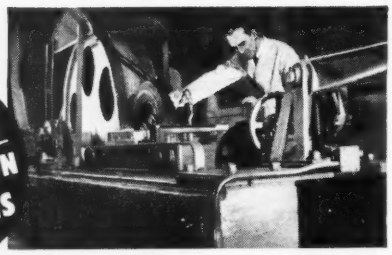

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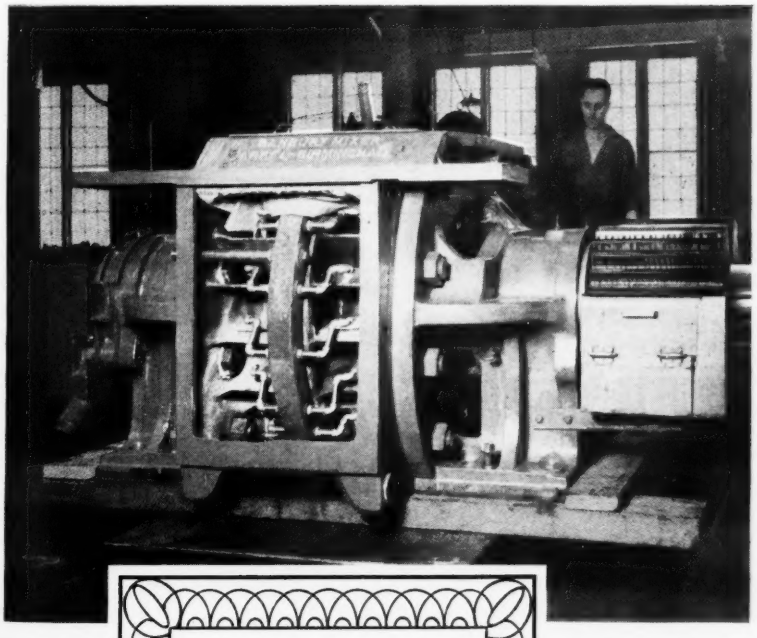

machined to jigs and fixtures in accordance with the original plans from which your Banbury was made.

In rebuilding a Banbury mixer there is no substitute for the experience and facilities on hand at Farrel-Birmingham. This company has the knowledge of all improvements that have been developed, which may be advantageously applied to your repair job; also the special equipment required to do the job best. Result: Banburys rebuilt at Farrel-Birmingham deliver new-machine performance... carry a new-machine guarantee.

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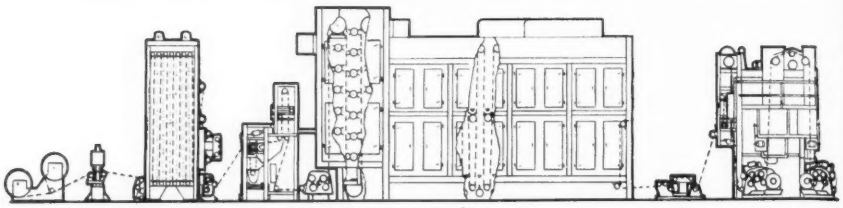

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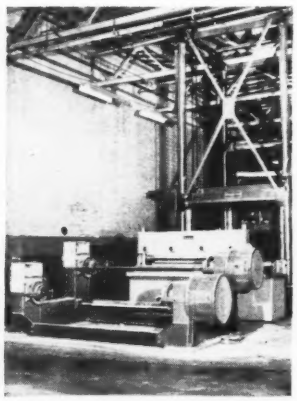
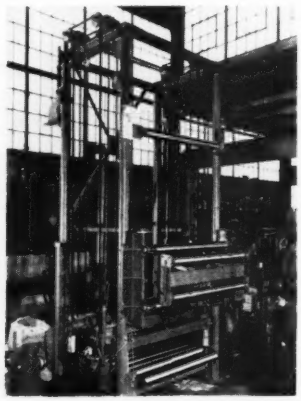
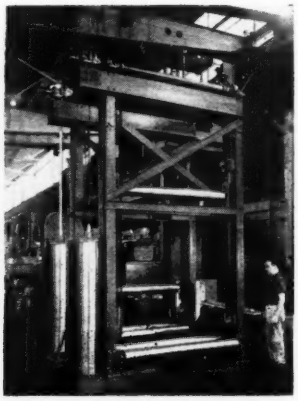


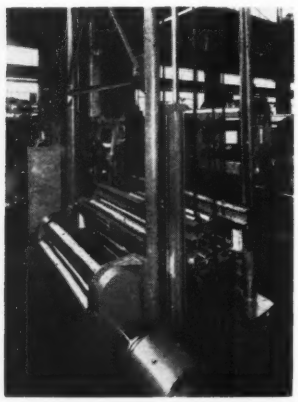
Dual Fabric Letoff



Accumulator & Fabric Guide Assembly



Compensators



Tension Rolls

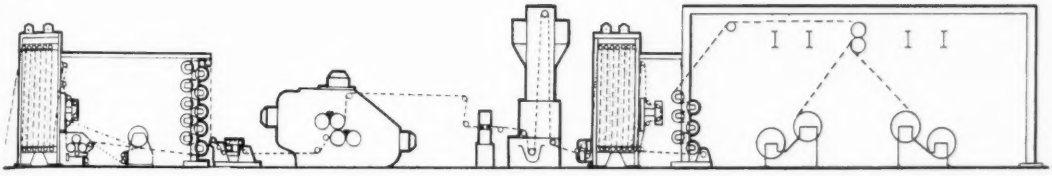
NYLON HOT-SETTING EQUIPMENT:

The patented high efficiency infra-red method can be furnished in Aetna equipment for the Hot-setting of nylon tire cord fabric. True uniformity of heat and exposure time under variable speed conditions is one of the features of this equipment. Units can be furnished single zone or multi-zone as desired and are suitable for installation in tandem with existing dip units, or calenders. Space requirements are held to a minimum.

PRE-DIP EQUIPMENT:

Pre-dip equipment by Aetna incorporates the latest developments in saturating equipment, positive uniform excess dip removal and high-efficiency air handling in the drying oven. Accurately controlled tensions are maintained throughout the process. Designs minimize cleaning requirements and provide complete accessibility for roll maintenance.

EQUIPMENT for processing TIRE FABRIC



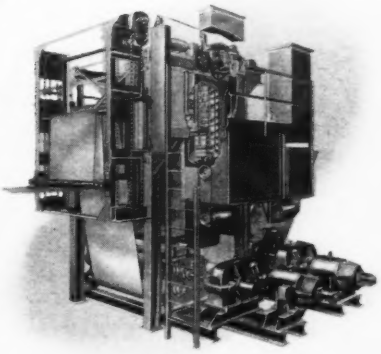
. . including latest type Nylon Hot Stretch Unit

EQUIPMENT TO DELIVER UNIFORM FABRIC

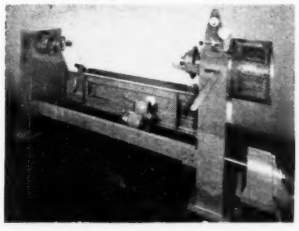
to your specifications

● Each processing line is designed to suit your particular requirements. Devices are available to control end count of the fabric, and to accurately guide the material to attain the utmost in uniformity. Accurate tension control equipment and uniform heating and drying are obtained by advanced designs.

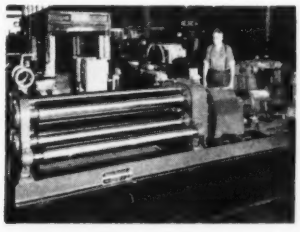
Individual units such as roll stands, letoffs, windups, storage and festoon compensators can be furnished for existing lines. All equipment is designed for the **heavy duty** requirements of the Rubber Industry.



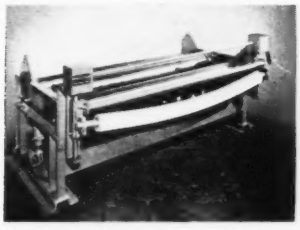
Nylon Hot-Setting Machine



Combination Windup & Letoff



Tension Roll Stand



Tension Control Stand

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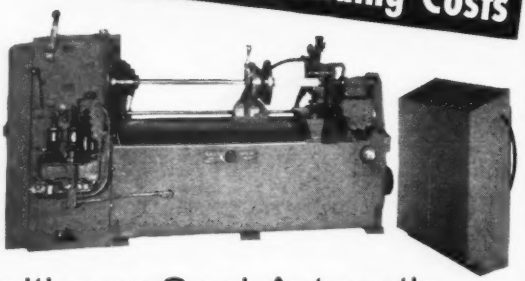

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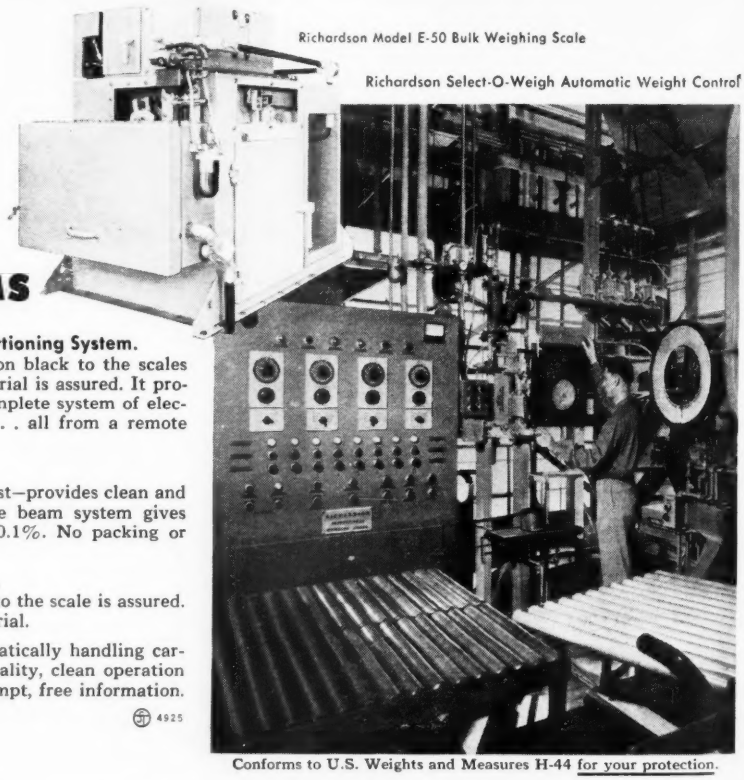

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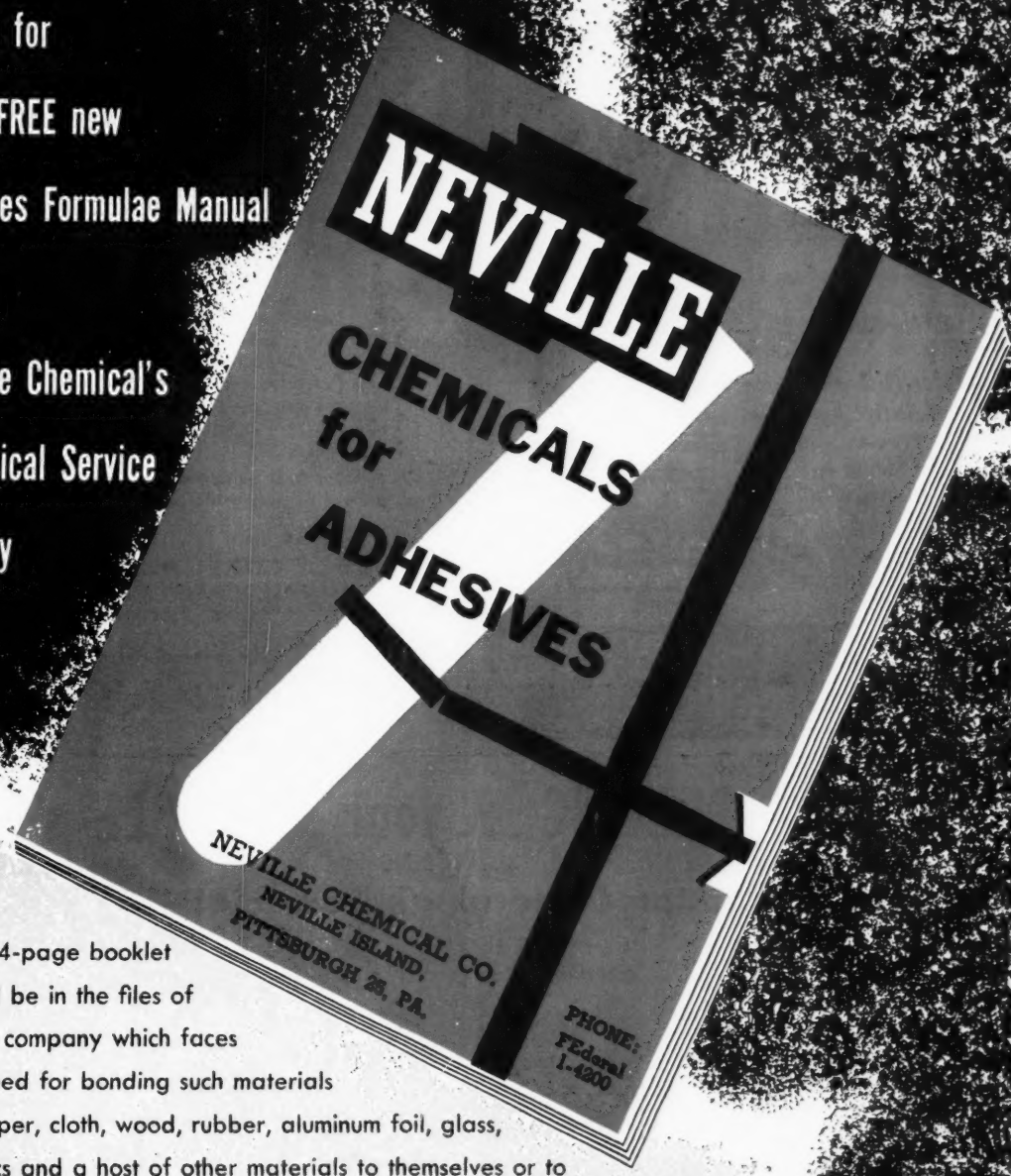

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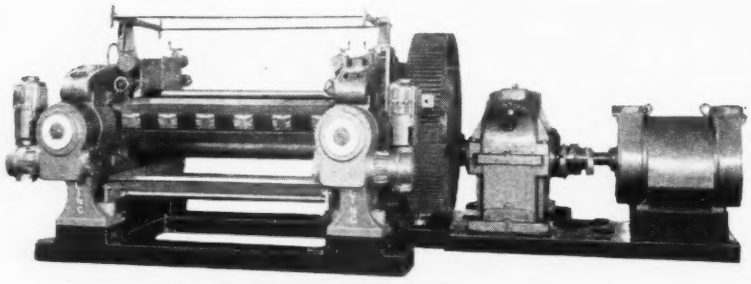

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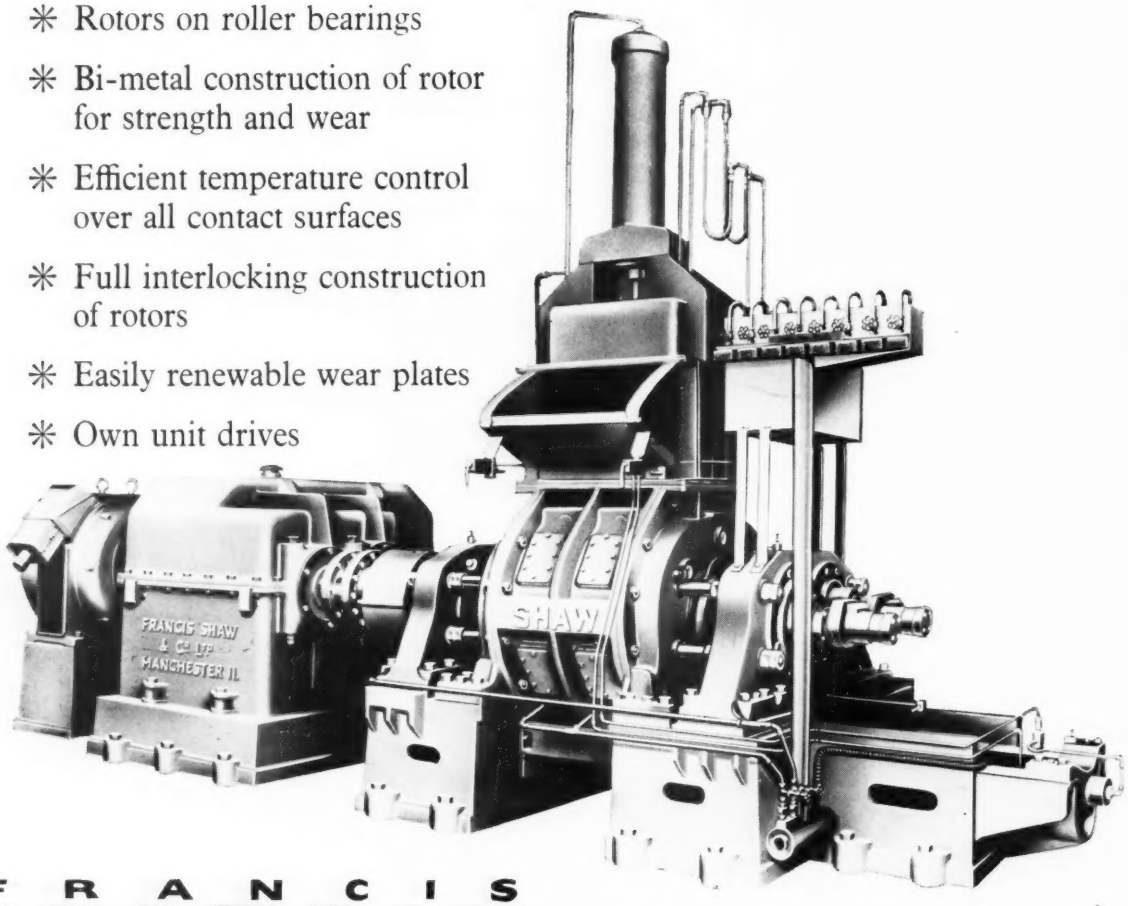

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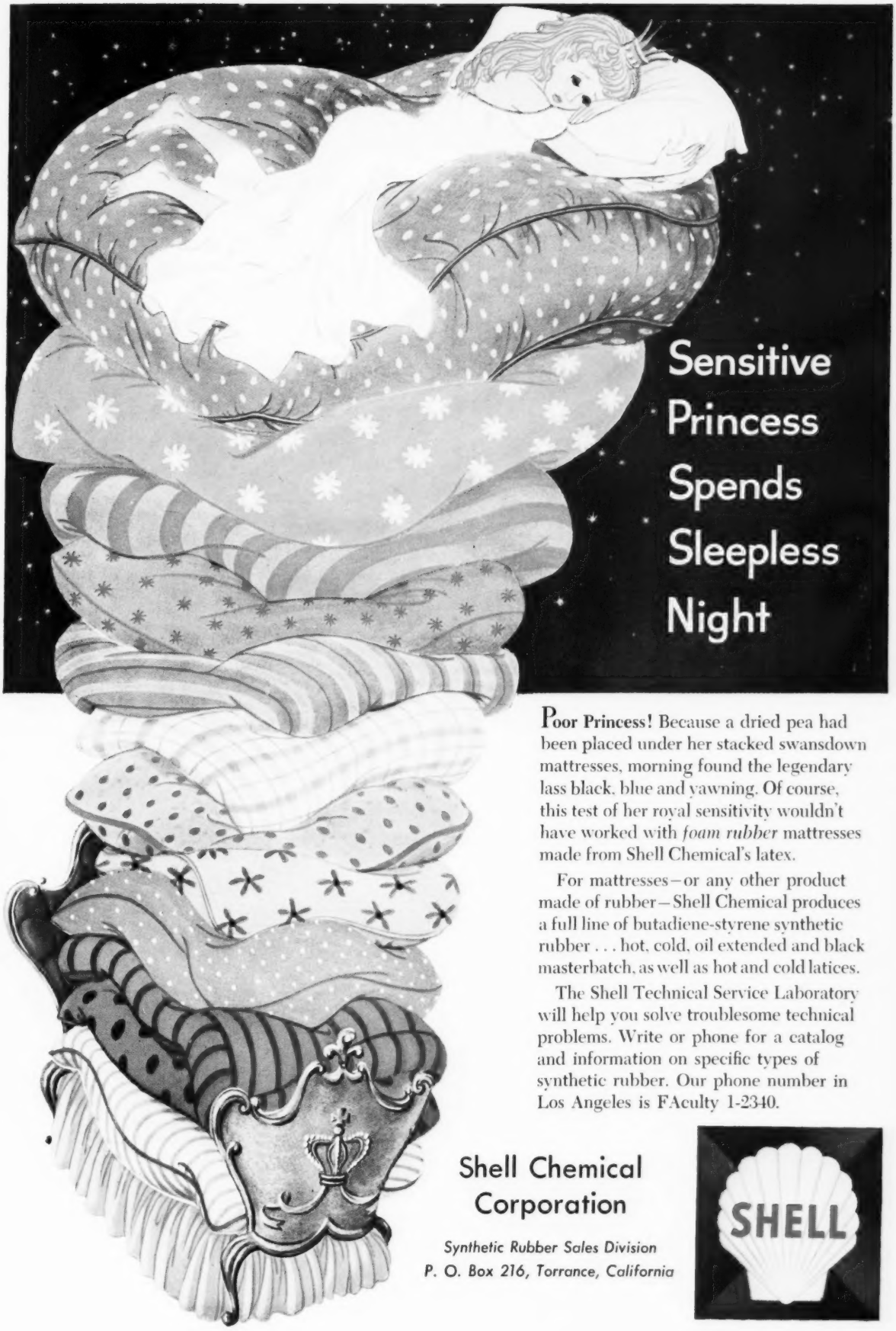

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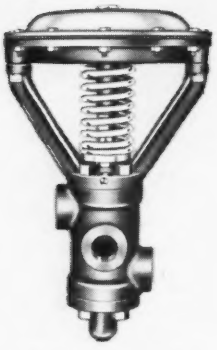

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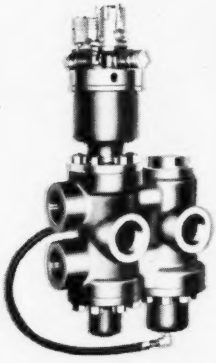

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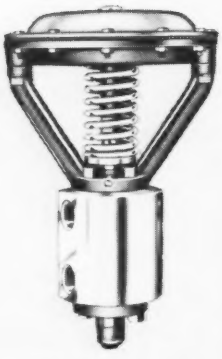

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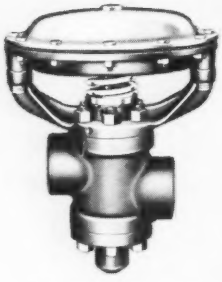

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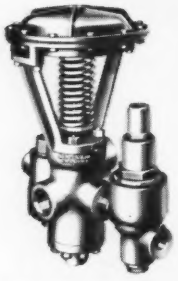

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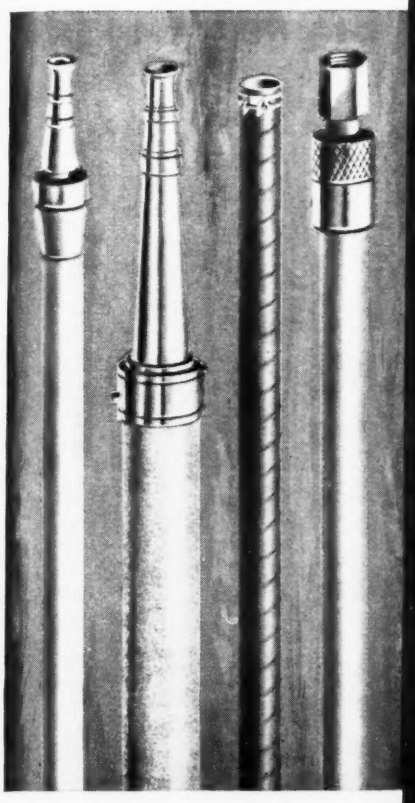

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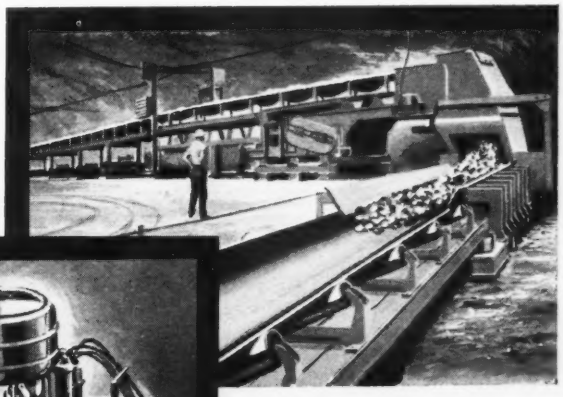

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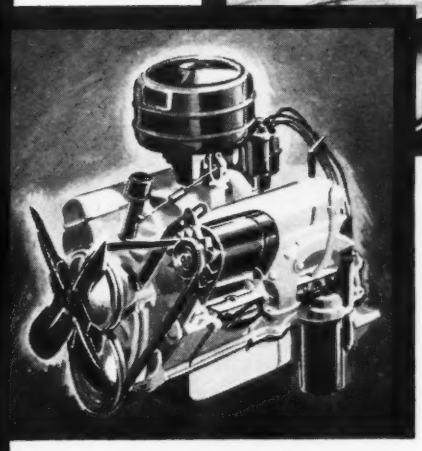

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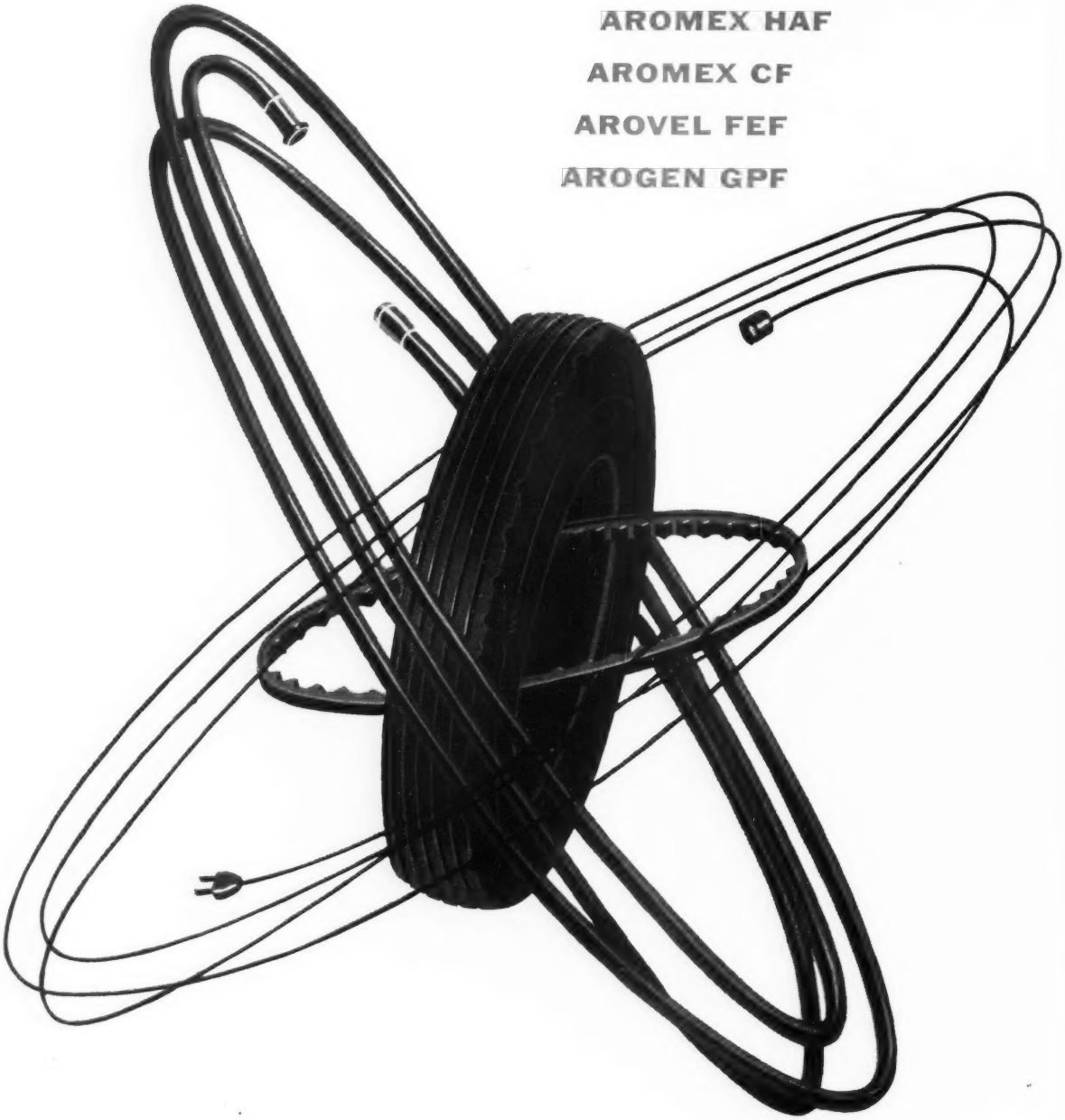

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RUBBER WORLD
EDITORIAL

Improving Technical Manpower Supply and Utilization a Must!

THE educational system in the United States and the utilization of technically trained manpower in this country is presently undergoing most severe criticism, and this criticism seems justified to a very great extent.

Although it has been known for some time that Russia had already won the battle of numbers of engineering and scientific manpower, the recent advent of Sputniks I and II demonstrated, at least in part, their superior quality and/or utilization of that manpower.

A little more than two years ago, or in December, 1955, we reported and supported in this column the position of Dr. A. W. Davison, vice chairman of the Engineering Manpower Commission of the Engineers Joint Council, who in an address before the Division of Rubber Chemistry of the American Chemical Society, emphasized that the shortage of technical manpower was becoming increasingly serious and recommended several ways to improve the situation.

Industry has contributed much since 1955 to the solution of this problem, but apparently these efforts must be further intensified. In addition, more efficient utilization of existing technical manpower must be practiced by all industry. The problem of more effective utilization of technical manpower was also underscored in this column as recently as September, 1957, when a report called, "Engineering Manpower—How to Improve Its Productivity," prepared by nine students at the Graduate School of Business Administration of Harvard University under the direction of Prof. George F. Doriot, was recommended to industry.

There are some further recommendations that can be made to the rubber and other industries with regard to the most efficient utilization of technical manpower. Too often a large percentage of science and engineering graduates is used for routine work of the type that could be done by reasonably bright high school graduates. Elimination of this situation wherever it exists would provide industry with a larger number of experienced scientists and engineers for more important work, and these people would be then encouraged to remain on their jobs instead of looking for new positions where their abilities might receive greater recognition. Not so very long ago the dean of an engineering school in a large university reported to the editor of RUBBER WORLD that his students were not particularly anxious to accept positions in the rubber industry because of its reputation for keeping engineering graduates too long on routine jobs.

Technical people employed in the rubber industry have shown exceptional interest in the last few years in technology and science courses made available to them outside their working hours by local rubber groups and colleges and universities. Industry is provided here again with another opportunity to improve the utilization of its technical manpower by continuing and increasing its encouragement of such activities.

R. G. Seaman

EDITOR

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RUBBER WORLD

Polyurethane VC, a Virtually Cross-Linked Elastomer[1]

By C. S. SCHOLLENBERGER, H. SCOTT, and G. R. MOORE
B. F. Goodrich Co. Research Center, Brecksville, O.

Elastomeric polyurethanes possess certain outstanding physical properties which have resulted in their use in an increasing number of commercial applications. Vulcanized polyurethanes cannot be recommended, however, for continuous service at elevated temperatures.

A linear poly(ester-urethane) called Polyurethane VC has been developed which displays the properties of a rubber vulcanizate and has a practical degree of solvent resistance without vulcanization. This polymer is therefore considered to be virtually cross-linked; hence the designation, "VC."

High tensile strength as well as good tear, abrasion, solvent, oil, and ozone resistance characterizes this polymer. Since these properties are realized in the unvulcanized state, many useful applications of the readily processable polymer can be made, avoiding the complications which attend the use of conventional (vulcanizing) urethane elastomers.

The combined action of air and sunlight produced some degradation of the raw polymer, thus indicating some deficiency in weather resistance. Compounding with EPC carbon black, conventional antioxidants, and ultra-violet absorbers greatly improves the resistance of the new polymer to such action.

SINCE the early work of Schlack (1, 3)[2] elastomeric polyurethanes have been the subject of considerable study. The interest in these polymers stems from the fact that they constitute a relatively new class of elastomeric materials possessing certain outstanding physical properties including high tensile strength, good tear resistance, good solvent resistance, excellent ozone resistance, high abrasion resistance, and versatile processability.

The manner in which the polymers are made allows considerable choice in the selection of reactants, permitting the preparation of "tailor-made" polymers of wide consistency and performance characteristics.

It is of interest that published information on useful elastomeric polyurethanes has been limited to vulcanized systems (2-7). It would seem by analogy with conventional elastomers that such systems should be the most valuable since cross-linking is known to confer dimensional stability, particularly at elevated temperatures, and solvent resistance, on elastomer systems. Vulcanized elastomeric polyurethanes can not be recommended, however, for continuous service at elevated temperatures owing to the thermal lability of their network systems which in effect spoils dimensional stability (8). It has been found, furthermore, that a practical degree of solvent resistance can be realized in unvulcanized polyurethane elastomers. These facts together with the complications encountered in cross-linking urethane polymers would seem to make practical unvulcanized polyurethane systems more attractive for many applications.

The present paper describes a new thermoplastic poly(ester-urethane) elastomer, Polyurethane VC, whose

[1]Presented before the Division of Rubber Chemistry, ACS, New York, N. Y., Sept. 13, 1957.
[2]Numbers in parentheses refer to Bibliography items at end of this article.

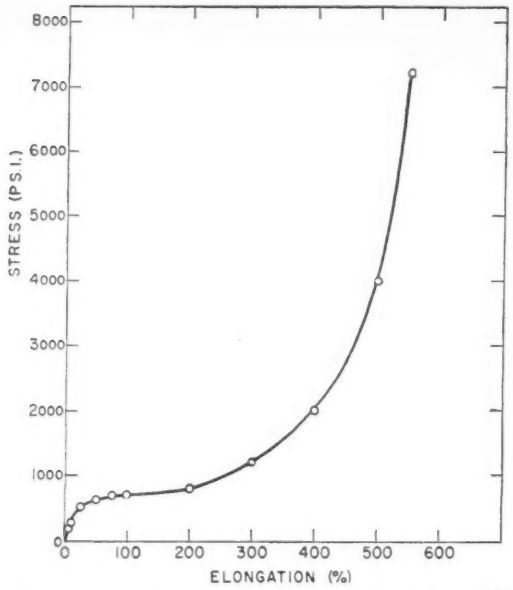


Fig. 1. Stress-strain properties of Polyurethane VC at 75° F.

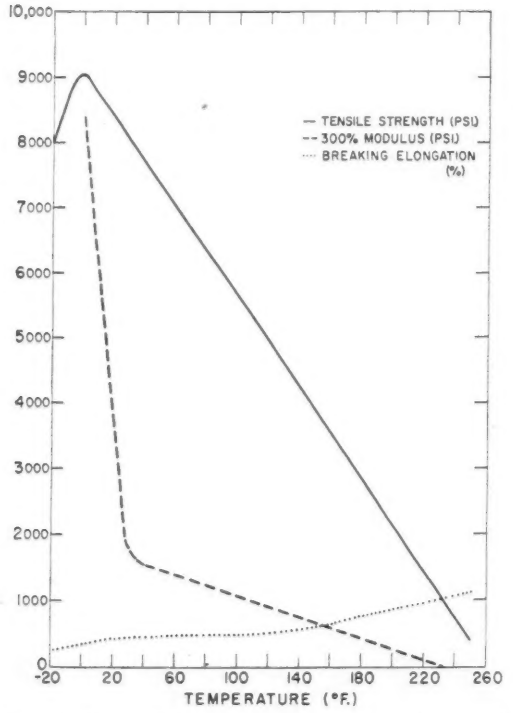


Fig. 2. Stress-strain properties of Polyurethane VC between —20 and +250° F.

unique properties recommend its use in the unvulcanized condition. This linear polymer, prepared from diphenylmethane-p,p′-diisocyanate, adipic acid, and butanediol-1,4, derives its name from the fact that although thermoplastic and completely soluble, it exhibits 550% extensibility as well as high elasticity. Its number average molecular weight is about 36,000. For these reasons the tough, strong polymer is considered to be virtually cross-linked; thus the designation, "VC."

Polyurethane VC is a stable elastomer whose useful applications are based on its form as supplied and need not involve the use of toxic polyisocyanates or their unstable partial reaction products. The polymer lends itself well to conventional processing techniques including milling, calendering, granulation, extrusion, jacketing, molding, and solution applications.

Original Physical Properties

The stress-strain curve for Polyurethane VC at 75° F. (Figure 1) shows the modulus and high strength of the rubbery polymer. The bulk of the curve was de-

TABLE 1. PHYSICAL PROPERTIES OF POLYURETHANE VC

Density $\frac{25}{25}$	1.207
Shore A hardness	85
Milling temperature (° F.)*	255
Melt flow temperature (° C.)†	123
Relative viscosity‡	1.36
Brittle point—ASTM D-746-55T (° C.)	below −74
Gehman low temperature modulus, ASTM D-1053-54T	
T_2 (° C.)	−10
T_5 (° C.)	−18
T_{10} (° C.)	−21
T_{100} (° C.)	−38
Freeze point (° C.)	−31
Air diffusion (mil ft./da. psi.-ft^3)	0.00028
Gasoline diffusion (fl. oz./ft^2/24 hrs.)	0.067
Yerzley resilience (% at RT), ASTM D-945-55	78
DeMattia flex life (to indices 1, 2) ASTM D-813-57T	639,000; 1 million
Graves angle tear resistance (lbs./0.1-in.), ASTM D-624-54	43
Abrasion resistance	
B. F. Goodrich Pico index§	360
Taber (g. loss)**	0.0025
Compression set, ASTM D 395-53T	
% at 25° C./22 hrs.	39
70° C./22 hrs.	87

*Stock temperature.

†The temperature at which the stock, in an isoviscous state, becomes plastic enough to extrude readily through an orifice 0.0625-inch in diameter under a pressure of 3,263 lbs/in.^{2}. From a semi-micro extrusion technique for the simultaneous determination of the second-order transition and softening temperatures of thermoplastic polymers (9).

The viscosity of polymers at this temperature as measured by the Olsen[5] parallel plate plastomer (10) is between about 50 X 10^5 to 400 X 10^5 poises.

‡At 25° C. and a polymer concentration of 0.4g/100ml. of dimethyl formamide, using an Ostwald-type viscosimeter.

§In this test twin parallel tungsten carbide knife edges under a load of about 10 pounds rest on the flat surface of a molded, disk-like test piece mounted on a turntable and rotated at about 60rpm as finely divided scouring material (e.g., silica) sifts continuously on to the contact area. After 80 rotations the weight loss of the sample is determined, converted to volume loss, and compared with that of a high-quality natural rubber-EPC black tire tread stock, index 100. Abrasion resistance is expressed relative to this value (11).

**CS17 wheels, 1000g./wheel, 5000 revolutions.

Note: ASTM tests from American Society for Testing Materials, Philadelphia, Pa.

Charles S. Schollenberger

Harvey Scott

Glenn R. Moore

The Authors

Charles S. Schollenberger, since September, 1947, research chemist at The B. F. Goodrich Co. Research Center, Brecksville, O., received his A.B. degree in chemistry in 1943 from the College of Wooster (O.) and his Ph.D. in organic chemistry from Cornell University in 1947. At present he is leader of the polyurethane section, rubber research, at Brecksville.

Dr. Schollenberger belongs to the American Chemical Society and its Akron Section and the Division of Rubber Chemistry, the Akron Polymer Lecture Group, Sigma Xi, and New York Academy of Sciences.

Glenn R. Moore attended the University of Akron and then Kent State University, from which he was graduated in 1955 with a B.S. in chemistry. His entire career has been spent with The B. F. Goodrich Co.: first as a laboratory technician, Works technical laboratory, Akron, O. (September, 1950-June, 1955); then as a research chemist at the Research Center at Brecksville; and from May, 1957, as a development engineer, products application laboratory, Avon Lake Development Center, Avon Lake, O.

Mr. Moore also is a member of the ACS and its Akron Section and Rubber Division.

Harvey Scott started with Goodrich in 1955 at its Brecksville Research Center as a rubber chemist and now is senior technical man in polymer research there. He completed his formal education at Lafayette College and the University of Delaware. He was awarded at the latter a B.A. in chemistry in 1951, an M.S. degree in 1953, and his doctorate in 1955. The last was earned through work in organic chemistry, with emphasis on polymer chemistry.

Dr. Scott holds memberships in the ACS, Alpha Chi Sigma, and Alpha Chi Rho.

termined by using the Scott tensile tester[3] at 20 inches/minute jaw separation. The portion of the curve below 100% elongation was measured on a Tate-Emery[4] testing machine at the same rate of jaw separation.

Figure 2, showing the stress strain properties of the polymer over the temperature range —20 to +250° F., suggests a relatively wide range of usefulness and at the same time demonstrates the thermoplastic nature of Polyurethane VC.

The results of continuous stress-relaxation determinations on Polyurethane VC at 30, 40, 60, 80, and 100° C. are given in Figure 3. Strip samples at 75% extension were used in the determinations. The data have been presented in terms of fraction of original stress, f/f_o, retained by the sample as a function of logarithmic time. The original stress (f_o) present in the sample was considered to be that measured at one minute. The straight-line nature of the curves and the long sample half-lives at 30, 40, and 60° C. are interesting features of the polymer performance.

Comparison of certain of these data with the results of a similar study performed by Offenbach and Tobolsky (8) on chemically cross-linked elastomeric polyurethanes at 20% extension shows the 80° C. half-life of Polyurethane VC (50 hours) to equal the 90° C. half-life of diisocyanate-cross-linked Vulkollan A. The 100° C. half-life of Polyurethane VC (five hours) would appear to be about half that of cross-linked Vulkollan A at the same temperature.

Other pertinent properties of Polyurethane VC are listed in Table 1.

Polyurethane VC is little affected by gasoline, hydrocarbon oils, PRL3313 diester oil,[6] and water. Aromatic hydrocarbons and more polar solvents swell the polymer; whereas tetrahydrofurane, dioxane, cyclohexa-

[3]Scott Testers, Inc., Providence, R. I.
[4]A. H. Emery Co., Stamford, Conn.
[5]Tinius Olsen Testing Machine Co., Willow Grove, Pa.
[6]A development of Pennsylvania Rubber Co., Jeannette, Pa. Current commercial counterpart is Turbo 15 oil (Penola Oil Co., Detroit, Mich.).

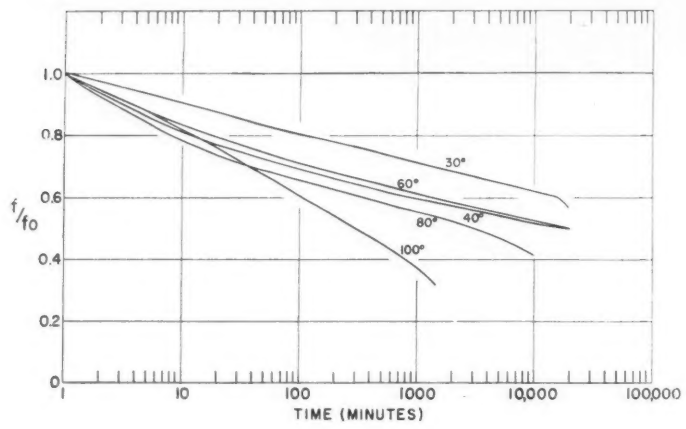


Fig. 3. Continuous stress-relaxation results at various temperatures between 30 and 100° C. (75% elongation tension method)

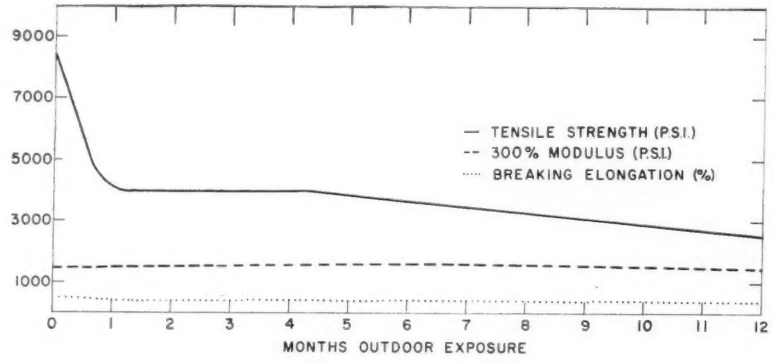


Fig. 4. Effect of outdoor weathering

none, and dimethyl formamide dissolve it.

The equilibrium moisture content of the polymer at 25° C. is 0.6% at 50% R. H. and 1.6% at 100% R. H.

Aging

Published information on elastomeric polyurethanes has emphasized the resistance that this class of polymers shows to the degradative action of oxygen (3, 5, 6), ozone (3, 5, 6, 12), aging (4), weathering (5), and ultraviolet light (5).

The above information was obtained from systems, all of which represent vulcanizates having networks presumably formed through covalent chemical bonds.

A study of the weather resistance of Polyurethane VC, a linear elastomeric poly(ester-urethane) has provided some interesting results.

As is the case with many useful linear polymers such as the nylons (13-14), polyethylene (15), etc., Polyurethane VC undergoes some degradation on exposure to natural and artificial weather conditions.

The degradation process is believed to involve an ultra-violet initiated autoxidation. It is apparent in the insolubilization and eventual embrittlement of the surface of unprotected polymer samples exposed to natural and artificial sunlight in the presence of air. The long exposure of massive samples produces subsurface insolubilization, but does not produce subsurface embrittlement.

Changes produced by natural weathering at Brecksville, O., have been followed by noting changes in the stress-strain properties of exposed Polyurethane VC stocks at periodic intervals. Such results, as seen in Figure 4, indicate a rapid initial rate of tensile loss on outdoor exposure, with subsequent losses being relatively slow.

This phenomenon might be explained as follows. Incident radiant energy initiates free-radical chains in the polymer; the surface radicals in contact with air (oxygen) form hydroperoxides; the hydroperoxides decompose to produce an extensively cross-linked surface which is more brittle, insoluble, and by measurement five times less permeable to air than it was before exposure; the surface, still transparent to ultra-violet radiation, allows free-radical chain formation in the subsurface polymer under anaerobic conditions; such free radical chains mutually terminate producing a network which is looser than that of the surface, more flexible, and tougher.

The exposed polymer shows a loss in tensile strength on initial exposure likely due to the embrittlement of its surface. The failure of subsequent exposure to embrittle the sample more deeply and thereby further weaken it is thought to be due to the reduced air permeability of its continuous, tightly cross-linked surface.

That the degradation of the polymer involves both oxygen and ultra-violet radiant energy is demonstrated by the stability of the polymer on open shelf storage and by the absence of any embrittlement of a Polyurethane VC sample sealed in a quartz tube under a pressure of 10^{-6} mm. of mercury on 154 hours of Weatherometer[7] exposure. A similar Weatherometer exposure of Polyurethane VC in air produces the sur-

face embrittlement and loss of strength characteristic of outdoor exposure.

In addition to the physical changes produced on the exposure of unprotected Polyurethane VC to natural and artificial weathering conditions, pronounced chemical changes also result. These are apparent in the infrared absorption spectrum of the polymer.

Figure 5, showing the infrared spectral changes in Polyurethane VC on Weatherometer exposure suggests a loss of aromatic structure and the disappearance of the urethane and some of the ester groups of the polymer.

The infrared spectral changes on the extended outdoor exposure of a somewhat heavier film of Polyurethane VC are being determined. Figure 6 shows

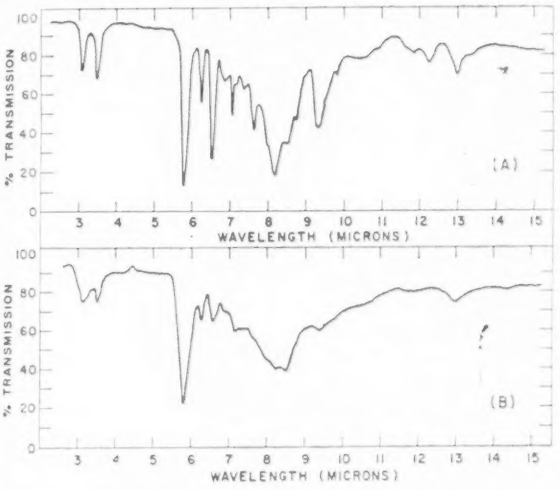


Fig. 5. The infrared absorption spectrum of a 1.5 mil unsupported film of Polyurethane VC: (A) unexposed; (B) after 154 hours in the Weatherometer

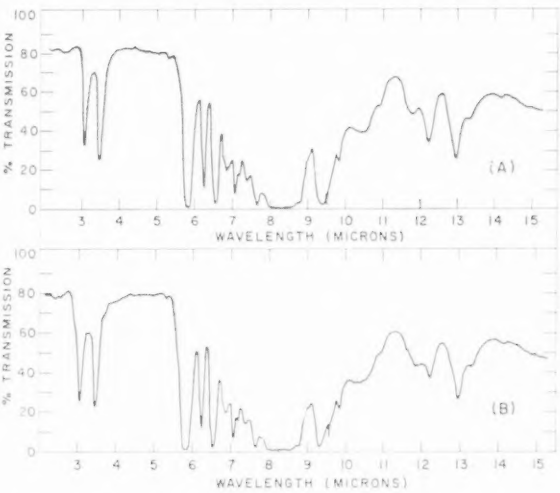
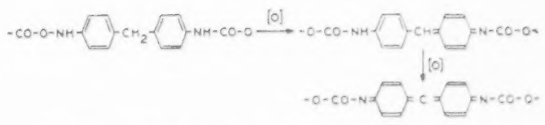


Fig. 6. The infrared absorption spectrum of a thin unsupported film of Polyurethane VC: (A) unexposed; (B) after three months of outdoor exposure

them to be much slower than the Weatherometer-induced changes.

Pronounced changes in the ultra-violet absorption spectrum of Polyurethane VC are also apparent after Weatherometer exposure. Figure 7 shows significant chemical changes to occur in the polymer film after but one-half hour of exposure.

The growth of an absorption peak at 270 to 310 mμ, believed to be due to the formation of a quinoid structure, and the simultaneous decline of the peak at 245 mμ, indicating a loss of aromatic structure, suggests to us the possibility of the autoxidation of the aromatic urethane groups in the polymer chains to the quinone-imide structure.



Adams has studied di-urethane oxidation in discrete molecules (16).

The tendency of quinone-imides to add active hydrogen substances (17), (here possibly the urethane groupings integral in adjacent chains) to themselves might account for the disappearance of the quinone absorption from the spectrum as well as contribute to the insolubilization of the polymer on extended weathering exposures.

Changes in its ultra-violet absorption spectrum simi-

[7]Twin lamp Type HVDL-X, 220 volts, 60 cycle; Atlas Electrle Corp., Chicago, Ill.; used exclusively without water spray.

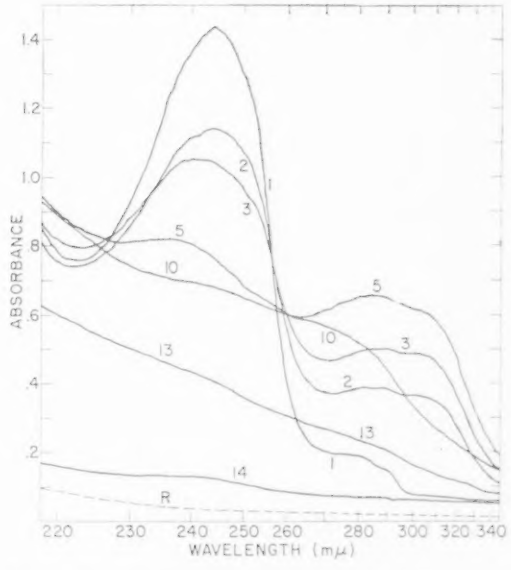


Fig. 7. Changes in the ultra-violet absorption spectrum of an extremely thin film of Polyurethane VC on Weatherometer exposure after (1) 0 hours, (2) 0.5 hour, (3) one hour, (5) two hours, (10) 12 hours, (13) 42 hours, (14) 196 hours. R equals air to air reference

lar to those resulting from Weatherometer exposure can be produced in Polyurethane VC by heating in air in the dark. At 140° C. the changes are relatively slow. They are attended by insolubilization (but not surface embrittlement) as well as some loss in the mechanical strength of the polymer sample.

Improved Weather Resistance

In view of the combined action of air and sunlight on Polyurethane VC, compounding studies were performed to determine the extent to which the weather resistance of the polymer can be improved by additives.

Carbon black proves to be a most effective stabilizer. Although there are numerous references in the literature to the incorporation of carbon black in elastomeric polyurethanes, only one could be found which mentions improved weather resistance for such combinations (6).

EPC, HAF, SRF, MT, ISAF, FF, FEF, and MPC blacks have been tested in Polyurethane VC. All improve the weather resistance of the polymer. An easy processing channel black, Wyex,[8] was rated the most effective of those examined, and an MT black, Thermax,[9] the least effective.

Figure 8 shows the change in stress-strain properties of 25 mil micro-dumbbell samples of unprotected Polyurethane VC and its compounds with 1.0 and 10.0 phr. of EPC black on 12 months[10] of outdoor exposure at Brecksville.

Although 1.0 phr. of EPC black allowed good retention of mechanical strength on exposure, surface embrittlement, as indicated by the fine surface cracks developing on extension of the exposed sample during stress-strain test, was not eliminated. No cracks developed, however, in the exposed stock containing 10.0 phr. of EPC black under the same circumstances.

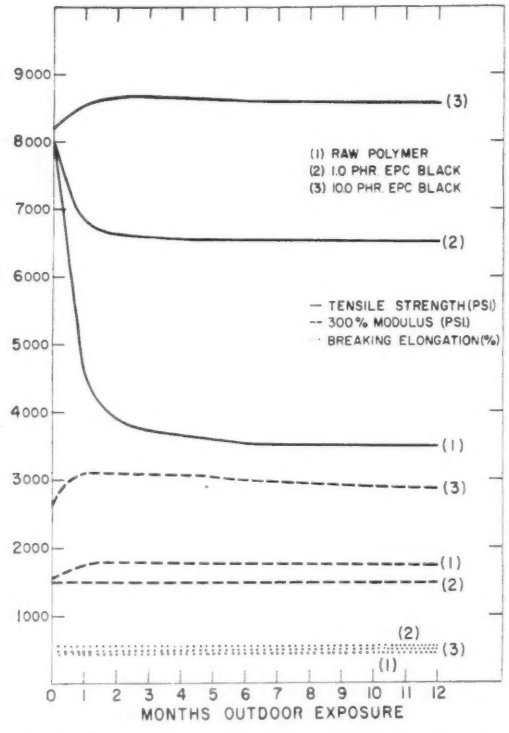


Fig. 8. Changes in stress-strain properties of Polyurethane VC and EPC black compounds after months of exposure outdoors

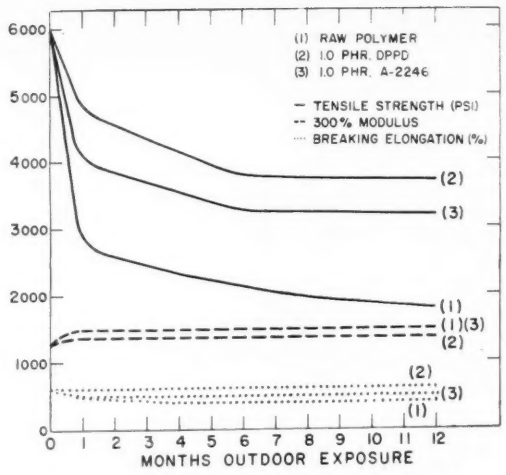


Fig. 9. Changes in stress-strain properties of Polyurethane VC and compounds with DPPD and Antioxidant 2246 on outdoor exposure

The stability of black-loaded Polyurethane VC to the weathering process must be due in part to the opacity of carbon black to incident radiant energy. It may also be explained in Szwarc's suggestion (18) that such high energy radiation yields free radicals in polymers which proceed to bond covalently to the free edge "active centers" or to the aromatic rings of contained carbon particles. Rather than degrading, the exposed black-loaded stocks knit together. Figure 8 shows increases in both the tensile and modulus values on the outdoor exposure of Polyurethane VC containing 10.0 phr. of carbon black.

The effect of several conventional amine and phenolic antioxidants on the weather resistance of Polyurethane VC proved to be beneficial. N, N′-di(phenyl)-p-phenylene diamine (DPPD) and N, N′-di(β-naphthyl)-p-phenylene diamine (AgeRite White)[9] were the most effective of those examined in 12-month[11] outdoor exposure studies at Brecksville.

Figure 9 shows the changes in stress-strain properties of 75 mil ASTM dumbbell samples of Polyurethane VC and its compounds with the most effective amine-type antioxidant tested (DPPD), and with 1.0 phr. of the most effective phenolic-type antioxidant tested, methylene-bis (2-hydroxy-3-tertiary butyl-5-methyl benzene) (Antioxidant 2246).[12]

On extended outdoor exposure DPPD at 1.0 phr. afforded a Polyurethane VC stock showing a definite

[8] J. M. Huber Corp., New York, N. Y.
[9] R. T. Vanderbilt Co., New York, N. Y.
[10] May, 1956—Apr., 1957.
[11] July, 1955—June, 1956.
[12] American Cyanamid Co., rubber chemicals department, Bound Brook, N. J.

improvement in tensile strength retention; a slight increase in breaking elongation; a slight decrease in modulus.

In the same exposure Antioxidant 2246 at 1.0 phr. afforded a Polyurethane VC stock showing somewhat less tensile strength retention than the DPPD compound; the same modulus changes as the unprotected polymer; slightly more elongation than the unprotected polymer.

None of the antioxidants examined proved capable of preventing the surface embrittlement of exposed stocks. Indeed, in more than one instance [AgeRite Powder (phenyl-β-naphthylamine), AgeRite White] it was necessary to conclude that the added antioxidant promoted, rather than prevented, surface embrittlement of the stock on exposure.

Polyurethane VC showed complete resistance to ozone attack in ASTM test procedure D 1149-51T which involves the 49° C., 150-hour exposure of a sample under 20% extension to 25 pphm. of ozone. Nevertheless the nine-month outdoor exposure of Polyurethane VC stocks containing 1.0 phr. each of the conventional antiozonants, UOP 88[13] (Universal Oil Products Co.) and Ozo 88,[14] showed the former to have a significant protective action in the polymer, appreciably improving tensile strength retention. Neither antiozonant prevented the surface embrittlement of exposed stocks.

A study of the effect of several commercially available ultra-violet absorbers on the weather resistance of Polyurethane VC involved Uvinul 490,[15] Uvinul 400,[15] Uvinul D-49[15] and UV Absorber No. 9[16] at levels of 0.1 to 10.0 phr. Uvinul 490 and Uvinul D-49 at the 3-5-phr. level provide fairly good protection for the polymer on outdoor exposure, completely preventing surface embrittlement of the stocks. At the most effective levels, however, these two materials tend to bloom from Polyurethane VC.

Summary and Conclusions

Many of the outstanding physical properties that characterize elastomeric polyurethanes have been realized in a soluble, thermoplastic variety. Polyurethane VC, which displays the superficial properties of a rubbery vulcanizate at room temperature and so is considered to be virtually cross-linked.

High tensile strength as well as good tear, abrasion, solvent, oil, and ozone resistance characterizes this polymer. Since these properties are realized in the unvulcanized state, many useful applications of the readily processable polymer can be made, avoiding the complications which attend the use of conventional (vulcanizing) urethane elastomers.

Outdoor exposure and indoor accelerated weathering studies demonstrated a deficiency in the weather resistance of the raw polymer. Weather-induced changes, believed to be due to ultra-violet-initiated autoxidation, have been estimated by noting changes in the stress-strain properties as well as the ultra-violet and infrared absorption spectra of the polymer on exposure to natural and artificial weather conditions.

The beneficial effects of certain carbon blacks, conventional antioxidants, and ultra-violet absorbers on the weather resistance of the polymer have been described.

[13]Universal Oil Products Co., Des Plaines, Ill.
[14]Burke Research Laboratories, Grosse Point, Mich.
[15]Antara Chemicals (General Aniline & Film Corp., New York, N. Y.).
[16]American Cyanamid Co., New York, N. Y.

Acknowledgment

The authors wish to express their appreciation to the Materials Branch, Electronic Parts and Materials Division of the United States Army Signal Engineering Laboratories, Fort Monmouth, N. J., for financial support of the compounding and weathering studies involved in the adaption of Polyurethane VC as an outer jacket for WD-1 (infantry field communication) wire.

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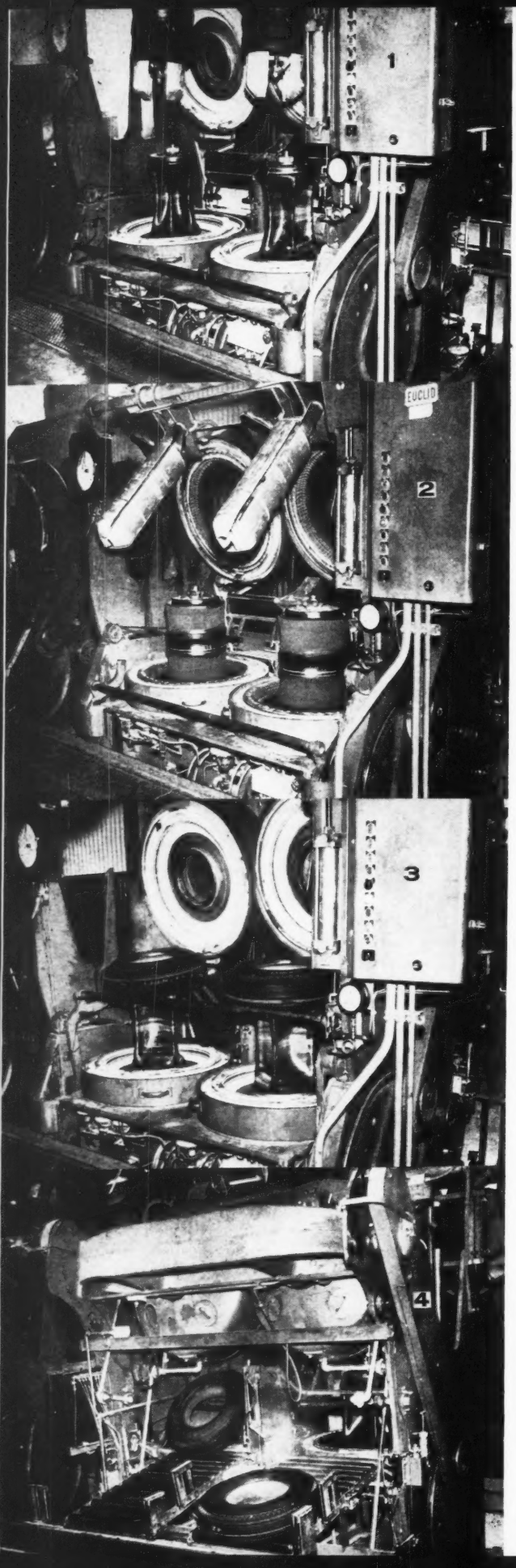
(18) M. Szwarc, *J. Polymer Sci.*, 19, 93, 589 (1956).

Operations Research in Industry

According to the results of a recent survey on the use of operations research in American industry, this new technique has become recognized since 1951 as a valuable tool in management decision making.

Today, the survey by the American Management Association showed, 324, or 51.3% of the 631 companies questioned, are now using operations research techniques, and of the 307 companies not using it, 144 indicated they are considering its adoption in the future.

Chemical and allied companies accounted for the largest percentage of users of operations research.



Goodyear Automates Automatic Presses

Green Tires Are Conveyed to Curing Presses; Then They Are Ejected on to Conveyor System To Finishing, Inspection, and Shipping Departments

A NEW $7½-million plant, described as the world's most fully automatic tire curing facility, is now in operation at the Los Angeles, Calif., plant of The Goodyear Tire & Rubber Co. Built to meet the growing demand for tires in the West, the modern plant houses 88 latest-design tire curing presses with 176 molds and is the first tire curing installation to apply automation to the loading and unloading of the intricate automatic presses.

In the process the uncured tires are brought on chain conveyors from tire builders located in adjoining sections into the new curing plant. These tires are temporarily stored or placed on other conveyors from which they are automatically fed to the curing molds.

At the curing molds (Figure 1) the automatic presses are ready to receive two green tires held above the press from where they will drop into place over the deflated air bladders below. As the press closes, the air bladders will simultaneously be inflated with steam to shape and cure the tire, while the mold provides the tread design.

The arms of the press (Figure 2), having deposited two uncured tires into the molds, move up to receive two more uncured tires from the automatic loading conveyor as the upper lids of the molds begin to close. The tires are cured.

Then as the deflated air bladder drops down into the press, a horizontal bar (Figure 3) tips the cured tires toward the rear of the press, on to a gravity conveyor (Figure 4) and thence on to a belt which carries them to finishing, inspection, and shipping stations.

The new curing plant, which is a one-story structure 140 feet wide and 540 feet long, is connected to the main factory by a tunnel and conveyor system.

Production at this plant also includes tires for heavy trucks, buses, and farm tractors, Airfoam rubber, airplane fuel cells, rotary hose, and a wide range of other molded and extruded rubber products for use in automotive and other industries. The plant produces in excess of 130 million pounds of rubber products annually.

Light-Colored, Non-Blooming Butyl Rubber Compounds

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Mr. Treat is a member of the American Chemical Society and its Division of Rubber Chemistry and of the American Society for Testing Materials and its Committee D-11 on Rubber and Committee D-24 on Carbon Black.

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He belongs to the American Chemical Society.

A GREAT deal of literature has been published, and thousands of independent studies have been made which will never be published, on the uses of butyl rubber since its introduction in quantity in 1943. Rubber compounders were quick to recognize and take advantage of the unusual properties of this polymer of isobutylene and isoprene. The inherent low degree of unsaturation and the lower solubility of some compounding ingredients in the butyl polymer meant, however, new problems for rubber compunders. Many of the regularly used compounding techniques had to be discarded. Productwise, the fact that butyl polymers exhibited a very low permeability to gases quickly led to their use in the production of inner tubes. The past experience of most rubber compounders with carbon blacks quite naturally led to their use in most of the initial butyl rubber compounds.

As early as 1942, however, Haworth and Baldwin[1] made initial contributions to the technology of compounding butyl rubber without carbon blacks, and in 1944 a study of curatives for butyl rubber in such stocks was published.[2] In this latter study, "all of the compounds shown in this report show a 'bloom' after a few days following cure." One and one half parts of elemental sulfur plus sulfur donors were used and, this paper deals with the "bloom" problem and shows ways of eliminating sulfur bloom.

From 1944 to 1948, very little data on non-black butyl rubber compounds was available in the form of published reports or papers. In 1948, Enjay Co.[3] published its first manual on butyl rubber compounding and processing. Since then many excellent papers have appeared. Wolf[4, 5] and Gage,[5] Zapp and Guth,[6] and, somewhat later, Gessler, Rehner, and Wiese[7] studied the reinforcement of butyl rubber with mineral fillers, with special emphasis on the use of silica and silicate pigments.

It is the purpose of this paper to show a number of recent butyl rubber compounding studies in which white or light-colored pigments were used in the production of light-colored, non-blooming, easy-processing rubber compounds. Specific applications of these com-

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Light-Colored, Non-Blooming Butyl Rubber Compounds

The results of recent butyl rubber compounding studies aimed at the development of light-colored, non-blooming, easy-processing stocks are reported in this paper.

These studies show that combinatons of about equal parts of tetramethyl thiuram disulfide and mercaptobenzothiazole, with mineral-filled butyl rubber produce vulcanizates with excellent stress-strain properties, low set characteristics, and with good color at a minimum of cost. Processing characteristics were also excellent. With such stocks the use of organic amine and glycol modifiers or activators produces noticeable improvements in physical properties of the vulcanizates.

It is revealed that regardless of the source of the sulfur, whether from primary sulfur or sulfur donors, if the total available sulfur exceeds about 1.4 phr., the compound will eventually bloom. To obtain maximum dispersion of sulfur, sulfur donors, accelerators, and plasticizers in butyl rubber, the stocks must be mixed at temperatures in excess of the melting points of these materials.

These studies show also that the ratio of mineral fillers to one another greatly affects the processibility and physical properties of the compounds. After the proper ratio of the most satisfactory mineral fillers has been determined, much higher total loadings are possible while excellent processibility is retained.

Combinations of silicate-type pigments and clays in butyl rubber stocks compounded with certain combinations of processing aids provide for easy-processing compounds with good physical properties

TABLE 1

Grade of Butyl	Mooney Viscosity ML 212° F. @ 8 Min.	Mol. % Unsaturation	Ozone and Chemical Resistance	Heat and Solvent Resistance
035 } 065* }	41–49	0.6–1.0	Excellent	Good
150 } 165* }	41–49	1.0–1.4		
215 } 265* }	41–49	1.5–2.0		
217 } 267* }	61–70	1.5–2.0		
218 } 268* }	71–80	1.5–2.0		
325 } 365* }	41–49	2.1–2.5	Good	Excellent

*Non-staining
Courtesy, Enjay Co., New York.

pounds in the production of end-products would, of necessity, require an analysis of available types of buytl rubber. A large number of types of butyl rubber were studied, including the listed types of Enjay Butyl[5] (Table 1).

Non-staining Enjay Butyl type 268 was used in most of the work reported in this paper since this type is midway in the range of unsaturation for the Enjay Butyl rubbers. From this midpoint, specific compounding changes could be made to satisfy the requirements of a particular end-product.

Many basic compounding studies were undertaken to determine the compatibility of mineral fillers with the various types of butyl rubber available. In these studies a set of laboratory procedures generally accepted by the rubber industry was applied for measuring the static and processing properties.

After determining the base recipe, a number of investigations were made to evaluate the effects of different types and amounts of accelerators, taking into account the basic color characteristics and cost of each. Combinations of mercaptobenzothiazole and tetraethyl thiuram disulfide were found to be entirely satisfactory for providing overall physical properties in the vulcanizates.

Total non-black pigment loading as well as the ratios and types of pigments used were found to be a very important consideration in the production of easy-processing, mineral-filled butyl rubber compounds. Adjustments in the types and amounts of pigments as well as the types and amounts of plasticizers and processing aids become necessary, depending upon the application and the type of butyl rubber used.

The degree of bloom in a butyl rubber compound was found to be related to the solubility of various compounding ingredients in butyl rubber; therefore it becomes very important to mix butyl rubber stocks at temperatures sufficiently high to melt soluble materials to effect complete dispersion and obtain maximum solution. Sulfur bloom was found to be directly related to the total available sulfur, whether it was obtained from elemental sulfur or sulfur donors.

Accelerators—Activators—Vulcanizing Agents

To say that any specific combination or ratio of curatives for a butyl rubber compound is unquestionably superior would be entirely presumptive. No single investigator in his lifetime could possibly evaluate all possible combinations of the presently available cura-

[5]"Butyl Compounding and Processing Manual," Enjay Co., Inc., New York, N. Y. (1955).

tives. The requirements that the end-products be made from non-blooming light-colored compounds would appear to rule out any curative with objectionable color. There are many cases where certain tints would not be objectionable, however, and some accelerators which produce tints are shown in these studies for comparison. The development of substantiating data on the functions of the other compounding ingredients used in the recipes will follow later in this article.

Except for the dibenzoyl-p-quinone dioxime (Dibenzo GMF)—lead peroxide (red lead) combination (Table 2) which shows a vulcanizate with original physicals having a fast flat cure, high modulus, and low tensile strength, the other accelerators tested showed vulcanizates with almost equal ultimate original tensile strengths. Tellurium diethyl dithiocarbamate (Tellurac) shows the highest original tensile strength and modulus properties. The delayed-action thiazole-type accelerators (Compounds 4, 5, and 6) when used alone, were very slow curing. The tetraethyl thiuram disulfide-mercaptobenzothiazole (Ethyl Tuads-MBT) combination shows good stress-strain properties and a good cure rate.

Both original and aged stress-strain values are shown from an academic standpoint in all the activation studies; however, discussions in this article are confined to the original properties only. Considering the colors of the finished stocks, the combinations of Methyl and Ethyl Tuads with MBT, benzothiazyl disulfide (MBTS) or the cyclohexyl thiazoles, shown in Table 2, produce essentially neutral shades. Since set characteristics are to receive special attention in these studies, the very excellent set shown by Compound No. 1 in Table 2 cannot be overlooked. At optimum cures the delayed thiazole types, as shown in Compounds No. 4 and 6, also exhibit excellent set characteristics.

Accelerator Efficiency Pattern

Compounds Nos. 1, 4, 5, and 6, each showing no significant discoloration and having potentially good

TABLE 2. COMPARISON OF ACCELERATOR SYSTEMS IN A MINERAL FILLED BUTYL COMPOUND

Base Compound		Compound
Enjay Butyl-268[d]	100.0	No. 1—Ethyl Tuads-1.5; MBT-1.5
Zinc oxide	5.0	2—Tellurac[b]-3.0
Stearate	3.0	3—Selenac[b]-3.0
Carbowax 6000[e]	2.0	4—Santocure[g]-3.0
Zeolex 23[f]	52.5	5—DIBS[a]-3.0
Suprex Clay[f]	52.0	6—NOBS Spec.[a]-3.0
Sulfur (added as 50% MB)	1.34	7—MBTS[a]-4.0; GMF[c]-2.0
Accelerators (as indica ed)		8—Dibenzo GMF[c]-6.0; red lead 10.0

Compound No.	1	2	3	4	5	6	7	8
Compound Color	neutral	yellow	yellow	neutral	neutral	neutral	brown	red
Press Cured, Min. @ 320° F.								
	Tensile Strength, Psi., Original and Aged*							
5	1490–1130	1610–1040	1270–1010	no cure	no cure	no cure	1040–880	1100–720
10	1610–1130	1670–1090	1650–1080	1380–1070	no cure	no cure	1320–840	1120–720
20	1660–1150	1560–1110	1480–1070	1550–1000	1640–1020	1620–940	1450–880	1150–710
	Modulus @ 500%, Psi., Original and Aged*							
5	590–800	640–840	400–880	no cure	no cure	no cure	†460–780	†670–680
10	790–800	800–840	760–880	400–740	no cure	no cure	710–780	760–680
20	850–800	910–840	870–900	580–760	550–740	640–700	860–790	840–690
	Ultimate Elongation, %, Original							
5	750	745	815	no cure	no cure	no cure	825	645
10	705	700	710	840	no cure	no cure	710	625
20	680	625	630	750	785	755	685	610
	Tear Resistance, Ppi., Hardness Shore A							
5	160–57	152–56	153–54	no cure	no cure	no cure	144–62	129–61
10	159–62	127–59	127–57	164–54	no cure	no cure	165–63	130–62
20	117–65	97–63	109–63	171–59	155–57	173–59	173–66	149–65
	Mooney Scorch, MS @ 250° F.							
	19.5	9.0	30+	30+	30+	30+	7.0	5.0
	Compression Set, % (ASTM, Method B, D 395–55, 70 Hrs. @ 100° C.)							
20	36.5	56.8	57.7	44.9	77.6	44.7	54.1	53.4
30	29.4	35.4	55.3	32.0	61.4	35.7	47.3	49.6

*Geer oven aged 48 hrs. @ 125° C.
†Modulus @ 300%, psi.
[a]American Cyanamid Co.
[b]R. T. Vanderbilt Co.
[c]Naugatuck Chemical Division, United States Rubber Co.
[d]Enjay Butyl non-staining type 268.
[e]Union Carbide Chemical Division of Union Carbide.
[f]Registered trade mark of J. M. Huber Corp.
[g]Monsanto Chemical Co.

TABLE 3. COMBINATIONS OF THIAZOLE ACCELERATORS WITH TETRAETHYL AND TETRAMETHYL THIURAM DISULFIDES

Base Compound		Compound No.
Enjay Butyl-268	100.0	No. 9—Ethyl Tuads-1.5; MBT-1.5
Zinc oxide	5.0	10—E hyl Tuads-1.5; Santocure-1.5
Stearate	3.0	11—Ethyl Tuads-1.5; DIBS-1.5
Carbowax 6000	2.0	12—Ethyl Tuads-1.5; NOBS Spec.-1.5
Zeolex 23	52.5	13—Methyl Tuads-1.5; MBT-1.5
Suprex Clay	52.0	14—Methyl Tuads-1.5; Santocure-1.5
Sulfur (added as 50% MB)	1.34	15—Methyl Tuads-1.5; DIBS-1.5
Accelerators (as indicated)		16—Methyl Tuads-1.5; NOBS Spec. 1.5

Compound No. 9	10	11	12	13	14	15	16
Press Cured, Min. @ 320° F.							
			Tensile Strength, Psi., Original and Aged*				
5	1540–1000	1250–960	960–1010	600–850	1360–920	1480–1090	1100–940	1360–1050
10	1560–1060	1520–1080	1660–1090	1560–880	1600–1100	1620–1180	1460–1080	1600–1180
20	1540–1080	1490–1060	1570–1040	1420–960	1540–1060	1690–1200	1460–1020	1520–1130
			Modulus @ 500%, Psi., Original and Aged*				
5	630–730	390–750	310–740	100–710	590–700	480–760	270–770	430–690
10	730–740	690–750	630–750	730–720	680–710	630–760	630–770	720–730
20	820–730	800–790	870–720	810–740	710–710	770–760	750–760	800–700
			Ultimate Elongation, %				
5	750	830	940	1140	745	795	900	835
10	710	735	755	700	720	760	720	710
20	670	665	670	635	705	720	665	665
			Tear Resistance, Ppi., Hardness (Shore A)				
5	146–60	163–56	143–54	118–54	158–60	156–59	139–59	158–58
10	149–61	132–60	140–57	121–61	149–61	158–60	143–61	129–63
20	128–63	125–63	123–63	109–64	128–63	134–63	112–63	104–65
			Mooney Scorch, MS @ 250° F.				
	12.0	14.5	12.5	30+	18.0	30+	10.5	12.5
			Compression Set, %, (ASTM, Method B, D 395–55, 70 Hrs. @ 100° C.)				
20	33.8	40.9	55.4	43.7	44.2	47.0	43.0	36.3
30	29.8	37.0	49.3	36.0	44.5	39.0	38.8	31.1

*Aged as in Table 2.

physical properties, were selected for further studies. The primary accelerators, Methyl and Ethyl Tuads, were used in combination with MBT and the delayed-action thiazoles to determine the relative merits of the secondary accelerators and at the same time determine if Methyl or Ethyl Tuads produced any significant differences in physical properties.

The data shown in Table 3 indicate that the Ethyl Tuads-MBT (No. 9) combination is faster curing than Methyl Tuads-MBT (No. 13) as shown by the tensile strength on the five-minute cure. Using this same viewpoint, the Methyl Tuads show a faster cure rate than do the Ethyl Tuads when used with the other three thiazole accelerators. The compression set data, as shown in Table 3, indicate the compounds accelerated with Ethyl Tuads-MBT (No. 9) and Methyl Tuads-NOBS Spec. (No. 16) produce the lowest compression set properties.

Since the Ethyl Tuads-MBT (No. 9) produced slightly better set properties and higher modulus than the Methyl Tuads-NOBS Spec. (No. 16), a series of compounds was run to determine the proper ratios and the relative efficiency of MBT and MBTS when used in combinations with Ethyl Tuads. The various ratios used are shown in Table 4.

TABLE 4. ETHYL TUADS-MBT-MBTS RATIOS

Ethyl Tuads, PHR.	MBT, PHR.	Ethyl Tuads, PHR.	MBTS, PHR.
3.5	...	3.5	...
3.0	...	3.0	...
2.5	0.5	2.5	0.5
2.0	1.0	2.0	1.0
1.5	1.5	1.5	1.5
1.0	2.0	1.0	2.0
0.5	2.5	0.5	2.5
...	3.0	...	3.0

By the use of the accelerator combinations shown in Table 4 in the base compound shown in Table 3, an accelerator efficiency pattern can be established. To minimize individual testing variations, and to show the combined effects of cure rates as well as optimum physical properties, a full range of five cures for each property was averaged and plotted, as shown in Figures 1 and 2. These data show, as may be expected,

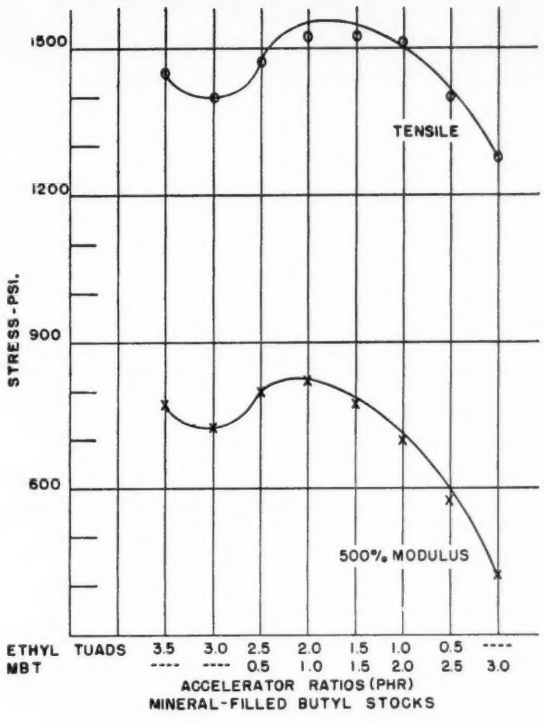

Fig. 1. Accelerator ratios in PHR. for Ethyl Tuads/MBT for mineral-filled butyl rubber stocks

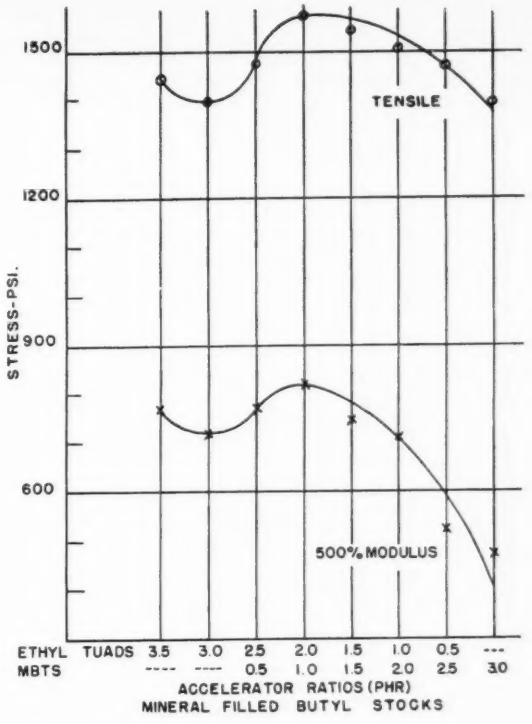

Fig. 2. Accelerator ratios in PHR. for Ethyl Tuads/MBTS for mineral-filled butyl rubber stocks

that a ratio of Ethyl Tuads-MBT or Ethyl Tuads-MBTS of 2.0:1.0 or 1.5:1.5 produces optimum values. It is immaterial whether the optimum range on these curves is due to cure rate or optimum stress-strain properties in establishing the overall accelerator efficiency pattern. It is obvious that combinations of these accelerators are much more effective than using either one alone even at a higher accelerator level.

Activator Evaluation

All the data presented to date on activation show the effects combined with a third material, polyethylene glycol at a molecular weight of 6000 (Carbowax 6000). Hausch[9] in 1953 proposed the theory of surface modification of the pigment based on the treatment with hydroxy compounds having long chains or pendant groups protruding into the rubber matrix, thereby producing vulcanizates with enhanced properties.

A number of the glycols and amines were evaluated in butyl compounds. Data presented in Table 5 show three of the most commonly used glycol and amine modifiers at 1, 2, and 3 PHR. Two PHR. of Carbowax 6000 (Compound No. 19) or about three PHR. of diethylene glycol (Compound No. 26) both produced the highest original and aged stress-strain properties, improved tear resistance for No. 19, when compared to the control, and in addition proved to be excellent mill release agents. Triethanolamine does not show any significant improvements in the original stress-strain values compared to the control, but produces an aged vulcanizate with increased tensile strength.

While not shown in Table 5 for the sake of simplicity, all three of these materials show the effect of increasing extrusion die swell and did not noticeably improve extrusion quality. While no discoloration was encountered during these studies which could be attributed to these modifiers, some reports have indicated this does happen. Carbowax 6000 produced stocks with the best compression set characteristics and is somewhat better than the TEA and DEG stocks.

Non-Blooming Butyl Compounds

Various aspects of producing non-blooming butyl compounds were studied and reported in early 1957.[10] The low degree of unsaturation of butyl, the low solubility of some compounding ingredients in butyl, the slow diffusion rate of air, and the soluble compounding ingredients in butyl are well known and must be thoroughly considered in producing a non-blooming butyl compound.

Solubility Studies

Solubility in butyl rubber of a number of plasticizers, accelerators, sulfur donors and including primary sulfur were determined. Weighed incremental amounts of the various compounding ingredients were

[9] Rubber World, 130, 59 (1954).
[10] "Butyl Compounding Study No. 1" and "Butyl Compounding Study No. 2." J. M. Huber Corp.

TABLE 5. COMPARISON OF ORGANIC ACTIVATORS IN A MINERAL-FILLED BUTYL COMPOUND

Base Compound	
Enjay Butyl-268	100.0
Zinc oxide	5.0
Stearic acid	.5
Zeolex 23	60.0
Ethyl Tuads	1.0
MBT	.5
Sulfur	2.0
Modifier (as indicated)	

Compound No.

17—None
18—Carbowax 6000-1.0
19—Carbowax 6000-2.0
20—Carbowax 6000-3.0
21—Triethanolamine[i]-1.0
22—Triethanolamine[i]-2.0
23—Triethanolamine[i]-3.0
24—Diethylene glycol[h]-1.0
25—Diethylene glycol[h]-2.0
26—Diethylene glycol[h]-3.0

Compound No.	Min. Cured (@ 320° F.	Mod. @ 500%, Psi. O*	Mod. @ 500%, Psi. A†	Tensile, Psi. O*	Tensile, Psi. A†	Elong., % O*	Tear, Psi. O*	Hardness, Shore A O*
17	5	500	725	1280	940	840	150	46
	0	715	895	1725	980	760	175	49
	20	815	950	1800	1085	725	148	53
18	5	450	640	1460	880	820	90	46
	10	710	770	1680	960	745	165	48
	20	750	830	1540	1080	690	148	53
19	5	510	820	1570	1290	830	178	46
	0	700	830	1800	1330	775	183	46
	20	810	880	1900	1270	730	148	51
20	5	350	590	1400	1160	865	183	43
	10	490	620	1560	1250	785	180	44
	20	580	680	1600	1220	745	168	47
21	5	520	680	1480	1080	795	164	49
	10	740	820	1670	1120	750	169	51
	20	790	800	1600	1080	700	119	53
22	5	520	680	1440	1100	800	158	48
	10	640	760	1480	1080	740	168	50
	20	710	800	1610	1120	735	154	52
23	5	400	610	1320	1040	820	149	45
	10	610	700	1460	1080	780	167	48
	20	660	790	1410	1070	740	157	49
24		610	880	1500	1010	795	153	46
	10	770	1020	1850	1150	770	162	47
	20	890	1100	1900	1250	720	133	52
25	5	650	1010	1590	1120	755	154	46
	10	810	1080	1670	1160	705	145	49
	20	970	1150	1770	1220	675	107	54
26	5	660	1080	1660	1390	760	149	46
	10	790	1100	1820	1350	735	152	49
	20	890	1170	1790	1300	695	120	53

Compound No.	Mooney Scorch, MS @ 250° F.	Compression Set, % as in Tables 2 and 3. Press Cured, Min. @ 320° F. 20	30
17	14.0	26.0	20.3
18	24.0	20.0	15.7
19	18.5	18.6	17.0
20	29.0	17.5	15.0
21	12.0	24.8	18.1
22	11.0	23.4	19.1
23	10.5	27.3	20.1
24	17.0	21.2	20.0
25	17.5	21.0	19.9
26	17.0	19.5	19.1

* Original
†Aged 48 hrs. @ 125° C.
[h]Union Carbide Chemicals Co., Division of Union Carbide Corp.
[i]Jefferson Chemical Co., Inc.

TABLE 6. SULFUR LEVEL FOR NON-BLOOMING BUTYL COMPOUNDS

Base Compound		Compound No.	Primary Sulfur	Total Available Sulfur
Enjay Butyl–268	100.0	27	0.90	1.16
Zeolex 23	60.0	28	1.00	1.26
Zinc oxide	5.0	29	1.10	1.36
Carbowax 6000	2.0	30	1.20	1.46
Methyl Tuads	2.0	31	1.30	1.56
Sulfur (as indicated)	2.0	32	1.40	1.66

Press Cured, Min. @ 320° F.	Compound No. 27	28	29	30	31	32
			Tensile Strength, Psi.			
5	1220	1330	1290	1390	1210	1200
10	1590	1600	1630	1680	1500	1470
20	1760	1730	1750	1730	1710	1690
			Modulus @ 500%, Psi.			
5	520	500	500	5 0	400	430
10	690	670	710	760	660	640
20	800	790	850	830	780	760
			Ultimate Elongation, %			
5	800	825	810	815	860	850
10	770	770	775	745	780	775
20	725	725	710	725	740	740
			Bloom Data, Rating			
5	sl. bloom	sl. bloom	sl. bloom	sl. bloom	heavy bloom	heavy bloom
10	sl. bloom	sl. bloom	sl. bloom	sl. bloom	heavy bloom	heavy bloom
15	sl. bloom	sl. bloom	sl. bloom	sl. bloom	sl. bloom	sl. bloom
20	spotty	spotty	spotty	spotty	sl. bloom	sl. bloom
30	no bloom	no bloom	no bloom	spotty	sl. bloom	sl. bloom

mixed into butyl rubber at temperatures above their melting points. Small samples of the mixtures were mounted on microscope slides and pressed out into thin films. These films were examined over a period of time, and the maximum solubilities determined. From these solubility studies a theory was evolved that any sulfur in excess of the "bound" sulfur and the soluble sulfur would eventually diffuse or migrate to the surface and show up as "sulfur bloom." Analyses of the % acetone extractable sulfur, % free sulfur and soluble sulfur led to the conclusion that total available sulfur in excess of 1.36 PHR. would eventually bloom even at a high state of cure.

Table 6 shows the results of a series of compounds at various sulfur levels. The total available sulfur is determined from the primary sulfur plus the 13% available sulfur from Methyl Tuads. A small quantity of carbon black was added to the batches in the non-blooming studies. The degree of bloom on these compounds was observed from time to time over a period of 14 months. No significant change was noted after the first 20 days. The data indicate that the degree of sulfur bloom is in a direct relation to the total available sulfur. Since the solubility of sulfur in cured and uncured butyl rubber is extremely low, the relation between the total available sulfur to the "bound" sulfur becomes very critical. The data indicate that total available sulfur in excess of 1.36 PHR. will bloom. The data also show that no significant change has occurred in stress-strain properties throughout the series.

Having shown that a total available sulfur level of about 1.5 PHR. will bloom, a series of compounds was mixed to determine whether combinations of primary sulfur and various sulfur donors would bloom. The total available sulfur was maintained at 1.5 PHR. Table 7 shows the effects of combinations of primary sulfur and sulfur donors on the physical properties and on bloom.

There is no evidence that the sulfur donors tested either improved the blooming characteristics or the physical properties. In fact, the formation of bloom is somewhat greater with the dipentamethylene thiuram tetrasulfide (Tetrone A). The alkyl phenol disulfide (Vultac #3) produced lower original tensiles and modulus, but showed good aged physicals. Primary sulfur produced the lowest set properties of the series. It is indicated from these studies that the degree of sulfur bloom is directly related to the total available sulfur present, whether obtained from primary sulfur or from sulfur donors.

Mixing Temperature Study

In much of the early work on mineral-filled butyl compounds the bloom appeared to be concentrated in spots rather than as a uniform layer of crystals. There were also indications of non-uniformity in stress-strain results. It was felt that this was due to poor dispersion of curatives since they were being added to the batch on a cold six- by 12-inch laboratory mill. To prove this

point, a low-temperature batch and a high-temperature batch were mixed. Both masterbatches were mixed in a "B" Banbury for seven minutes and dumped at 260° F. The sulfur was added to the high-temperature batch in the Banbury, followed by the accelerator addition on a six- by 12-inch laboratory mill. The sulfur and the accelerator both were added to the low-temperature mix on the six by 12-inch laboratory mill at a temperature below the melting point of sulfur. Table 8 shows the results of these tests.

There is definite evidence of degradation of physical properties and spotty bloom in Compound No. 37. If factory mixed butyl stocks are Banbury mixed at temperatures in excess of 240° F., this effect is not likely to be encountered. In other types of rubber polymers where diffusion rates and solubilities are much higher than in butyl rubber, mixing procedures are not so critical. The bloom indicated on Compound No. 38 was much less pronounced and was evenly distributed. Also, the physical properties of Compound No. 38 are considerably better than those of No. 37. It appears that local overcure or local undercure caused by incomplete dispersion is responsible for the spotty bloom and the poor stress-strain properties in the low-temperature mixture.

Non-Blooming Mineral-Filled Extrusion Compounds

The selection of the type of mineral filler for use in butyl rubber depends largely on the end-use. The product specifications for most extruded butyl rubber parts would require basic minimums on stress-strain properties, resistance to oxidation, and resistance to chemicals and oils, and the stock would necessarily have to extrude and process smoothly and safely. The product would have to be non-blooming and should exhibit good cold flow and set characteristics when subjected to static and dynamic stresses.

The extrusion compounds shown are not designed for a specific end-product, but are compounded to show the effects of types of pigments, ratios of pigments,

TABLE 7. SULFUR DONORS IN NON-BLOOMING BUTYL STOCKS

Compound No.	33	34	35	36
Enjay Butyl-268	100.0	100.0	100.0	100.0
Zeolex 23	60.0	60.0	60.0	60.0
Zinc oxide	5.0	5.0	5.0	5.0
Carbowax 6000	2.0	2.0	2.0	2.0
Methyl Tuads*	2.0	2.0	2.0	2.0
Sulfur*	1.24	0.84	0.86	0.82
Donor A*	—	1.5	—	—
B*	—	—	1.5	—
C*	—	—	—	1.5
Total available sulfur*	1.5	1.5	1.5	1.5

Press Cured, Min. @ 320° F.	Compound No. 33	34	35	36
		Tensile Strength, Psi., Original and Aged		
5	1440–960	1440–840	1480–1040	1120–970
10	1700–980	1680–860	1600–1040	1480–1090
20	1630–1020	1540–970	1530–1010	1430–1040
		Modulus @ 500%, Psi., Original and Aged		
5	645–690	610–700	645–900	455–650
10	790–770	745–740	810–910	570–690
20	900–830	800–790	945–960	610–690
		Ultimate Elongation, %		
5	750	760	750	775
10	725	710	710	770
20	670	690	635	770
		Compression Set, %, (ASTM, Method B, D 395–55, 70 Hrs. @ 100° C.)		
20	18.8	21.7	19.9	35.0
30	17.0	18.1	19.7	39.8
		Bloom Data, Rating		
5	bad bloom	bad bloom	ex. bad bloom	bad bloom
10	bad bloom	bad bloom	bad bloom	bad bloom
15	spotty	spotty	bad bloom	bad bloom
20	spotty	spotty	bad bloom	spotty
30	spotty	spotty	bad bloom	spotty

*Total available sulfur based on 13% in Tuads, 27% in (Donor A) morpholine disulfide (Sulfasan R),[g] 25% in (Donor B) dipentamethylene thiuram tetrasulfide (Tetrone A),[i] and 28% in Donor C) alkyl phenol disulfide (Vultac #3).[k]

[g]Monsanto Chemical Co.

[i]E. I. du Pont de Nemours & Co., Inc., rubber chemicals division.

[k]Pennsalt Chemicals Corp., industrial division.

Table 8. Effect of Mixing Temperatures on Blooming of Butyl Compounds

Compound No.	37 Low-Temperature	38 High-Temperature
Enjay Butyl-365	100.0	100.0
Zinc oxide	5.0	5.0
Zeolex 23	60.0	60.0
Carbowax 6000	.0	2.0
Methyl Tuads	2.0	2.0
*Sulfur	1.24	1.24
*Total available sulfur	1.5	1.5
Press Cured, Min. @ 320° F.	Compound No. 37	38
	Tensile Strength, Psi.	
5	1420	1460
10	1480	1620
20	1040	1620
	Modulus @ 500%, Psi.	
5	500	420
10	750	670
20	870	840
	Ultimate Elongation, %	
5	800	850
10	700	750
20	550	675
	Tear Resistance, Ppi.	
5	170	173
10	127	148
20	93	108
	Mooney Scorch, MS @ 250° F.	
..	23.5	29.5
	Compression Set, % (Same Conditions as Shown in Previous Tables)	
20	24.5	21.9
30	17.8	19.8
	Bloom Data, Rating	
5	bloom	bloom
10	bloom	sl. bloom
15	bloom	sl. bloom
20	spotty	no bloom
30	spotty	no bloom

total pigment loadings, and various ways of producing a compound that will process and extrude satisfactorily. Changing from one butyl polymer type to another will involve certain basic adjustments in pigment loadings, softener adjustments, and accelerators and curative adjustments.

Pigment Types

In Table 9 a series of three well-known silica and silicate pigments was compared at equal volume loadings in the regular butyl test recipe used in other previous studies. No attempt was made to adjust the curative level for the hydrated silica (Hi-Sil 233) which shows an optimum tensile strength at 20 minutes; while the calcium silicate (Silene EF) and sodium silico aluminate (Zeolex 23) reached optimum at about 10 minutes @ 320° F.

Processing Aids

Preliminary work on non-black butyl extrusion compounds indicated that for easy processing, freedom from mill roll sticking, and smooth extrusions, certain processing aids were necessary and permitted much higher loadings of mineral fillers, thus effecting a considerable reduction in compound costs. A large number of processing aids were evaluated. Table 10 shows the effects of three types.

It is evident that each material plays an independent function. Zinc stearate has a slight cure activating effect and has a noticeable effect on reducing compression set and increasing extrusion rate and swell, but has no noticeable effect on extrusion quality. Zinc stearate has a marked effect on reducing tackiness in processing. Paraffin has the lowest extrusion rate and swell of the

Table 9. Comparison of Silica and Silicate Pigments in a Butyl Test Recipe

Compound No.	39	40	41
Enjay Butyl-268	100.0	100.0	100.0
Zinc oxide	5.0	5.0	5.0
Carbowax 6000	2.0	2.0	2.0
Ethyl Tuads	2.0	2.0	2.0
Sulfur*	1.24	1.24	1.24
Zeolex 23	60.0	....	....
Silene EF[m]	....	60.0	....
Hi-Sil 233[m]	....	....	55.8
Press Cured, Min. @ 320° F.	Compound No. 39	40	41
	Tensile Strength, Psi., Original and Aged		
5	1920–1260	1470–890	1920–1400
10	2050–1400	1510–840	2230–1340
20	1960–1400	1480–840	2370–1320
	Modulus @ 500%, Psi., Original and Aged		
5	670–730	690–720	550–1130
10	830–770	820–710	840–1160
20	910–790	900–710	1100–1190
	Ultimate Elongation, %		
5	815	725	910
10	740	665	810
20	710	630	760
	Tear Resistance, Ppi.		
5	196	163	255
10	182	147	280
20	175	124	306
	Hardness (Shore A)		
5	51	52	63
10	54	56	66
20	55	58	71
	Mooney Scorch, MS @ 250° F.		
..	27.5	36.5	6.5
	Compression Set, % (Same Conditions as Shown in Previous Tables)		
20	25.3	23.6	63.0
30	19.4	23.0	54.7

*Total available sulfur 1.50 parts (maximum for non-blooming).

[m]Columbia Southern Chemical Corp., division of Pittsburgh Plate Glass Co.

TABLE 10. PROCESSING AIDS IN MINERAL-FILLED BUTYL EXTRUSION COMPOUNDS

Compound No.	42	43	44	45
Enjay Butyl-365	100.0	100.0	100.0	100.0
Zinc oxide	5.0	5.0	5.0	5.0
Carbowax 6000	2.0	2.0	2.0	2.0
Ethyl Tuads	1.5	1.5	1.5	1.5
MBT	1.5	1.5	1.5	1.5
Sulfur*	1.34	1.34	1.34	1.34
Zeolex 23 (25 vol.)	52.5	52.5	52.5	52.5
Suprex Clay (20 vol.)	52.0	52.0	52.0	52.0
Zinc stearate[n]	...	3.0	...	...
Paraffin[o]	...	...	5.0	...
Petrolatum[p]	...	...	...	15.0

Press Cured Min. @ 320° F.	Compound No. 42	43	44	45
	Tensile Strength, Psi.			
10	1260	1290	1290	1170
20	1270	1130	1300	1280
40	1230	1090	1200	1130
	Modulus @ 300%, Psi.			
10	420	370	380	290
20	490	440	440	340
40	500	470	470	350
	Ultimate Elongation, %			
10	700	695	695	740
20	645	600	650	675
40	605	545	600	635
	Tear Resistance, Ppi.			
10	145	120	169	140
20	130	115	135	125
40	125	110	130	110
	Hardness (Shore A)			
10	65	63	61	56
20	67	66	66	59
40	71	69	67	62
	Compression Set, % (Same Conditions as Used in Previous Tables)			
20	41.6	35.8	47.3	44.4
40	41.1	34.6	43.6	40.5
	Mooney Scorch, MS @ 250° F.			
..	22.5	19.0	21.5	20.5
	Mooney Viscosity, MS 4 @ 212° F.			
	60	44	48	38
Extrusion Data: #1½ Royle tuber, 0.125-inch die, Garvey die, die heated to 240° F. Specimen samples collected on second pass.				
Rate, cc/min.	86.75	127.5	92.35	107.5
Die swell, %	31	74	35	47
Garvey index	12	12	14	14

*Total available sulfur 1.50 parts (maximum for non-blooming).
[n]Synthetic Products Co.
[o]Gulf Oil Co.
[p]Standard Oil of New Jersey.

three materials tested and greatly improves the appearance of the extrusions. Petrolatum has the greatest plasticizing effect. It appears that a combination rather than a single processing aid is necessary for a compound with all-around good performance.

The development of an easy-processing light-colored butyl extrusion compound involves a proper balance of processing aids. In this type of compound the determination of the types and ratios of pigments and the total pigment loading becomes of primary importance. A series of compounds was mixed using a low silicate-high clay to a high silicate-low clay, as shown in Compounds No. 46 through No. 49 in Table 11. The total volume loading was maintained at 45 volumes.

Pigment Ratios

It was thought that the total volume loading could be increased considerably and still maintain excellent processibility if the proper ratio of pigments were determined. Recipe No. 48, with a silicate-clay ratio of 25.0:20.0 volumes was selected on the basis of freedom from mixing and processing problems and excellent extrusion properties. Using a five-volume differential, the total pigment loadings were stepped up to 65 volumes, Compound No. 50, using the hard clay, and to 75 volumes, Compound No. 51, using the soft clay.

The excellent extrusion quality was maintained with these increased loadings. Rate and die swell show a marked decrease in both instances. While the Mooney scorch remains essentially unchanged, the Mooney viscosity shows a rapid increase. Compression set as well as tensile values suffers from increased loadings; however, tear resistance is improved.

It has been shown that combinations of mineral fillers can be used to produce good-quality butyl compounds provided the selection and the use of the proper processing aids are carefully studied, and the proper ratios of the pigments used are determined; then much higher total loadings are possible. If the specifications of the finished product will allow lower physical properties and slower extrusion rates and lower die swell, considerable savings in compound costs can also be achieved.

Summary and Conclusions

These basic compounding studies were undertaken to produce data which could be used to compound any number of mineral-filled, light-colored butyl rubber products which are being demanded by the automotive and other industries. Since a large number of these compounds will be extruded into intricate profiles, good processibility becomes of primary importance.

A large number of accelerators, activators, and curatives were studied; kept in mind were overall activation efficiencies in relation to the improvements in physical properties desired. While no specific costs are given, costs were considered as well as the color properties of the compounded stocks.

These studies show that combinations of about equal parts of tetramethyl thiuram disulfide or tetraethyl thiuram disulfide with mercaptobenzothiazole produce mineral-filled butyl rubber stocks with excellent stress-strain properties, safe processing, color, and low set characteristics at a minimum cost. With mineral-filled butyl stocks, the use of organic amine and glycol modifiers produces noticeable improvements in physical properties of the vulcanizates.

The extremely low compatibility or solubility of some

TABLE 11. DETERMINATION OF RATIOS OF PIGMENTS AND TOTAL LOADINGS

Base Compound	
Enjay Butyl-365	100.0
Zinc oxide	5.0
Stearate	3.0
Carbowax 6000	2.0
Paraffin	5.0
Petrolatum	15.0
Ethyl Tuads	1.5
MBT	1.5
Sulfur*	1.34
Pigments (as indicated)	

Compound No.	Compound
46	Zeolex 23 — 15 vol.; Suprex Clay — 30 vol.
47	Zeolex 23 — 20 vol.; Suprex Clay — 25 vol.
48	Zeolex 23 — 25 vol.; Suprex Clay — 20 vol.
49	Zeolex 23 — 30 vol.; Suprex Clay — 15 vol.
50	Zeolex 23 — 35 vol.; Suprex Clay — 30 vol.
51	Zeolex 23 — 40 vol.; Paragon Clay[a] — 35 vol.

Press Cured Min. @ 320° F.	Compound No. 46	47	48	49	50	51
			Tensile Strength, Psi.			
5	1290	1170	1210	1130	640	700
10	1320	1250	1250	1190	920	800
20	1240	1220	1200	1160	960	800
			Modulus @ 500%, Psi.			
5	300	310	320	360	490	440
10	450	460	470	500	560	560
20	540	600	620	670	720	690
			Ultimate Elongation, %			
5	845	805	805	795	730	670
10	825	785	785	760	700	650
20	670	665	660	645	600	575
			Tear Resistance, Ppi.			
5	130	138	143	142	146	135
10	125	125	130	135	145	125
20	90	100	105	105	140	115
			Hardness (Shore A)			
5	54	55	54	53	58	61
10	56	56	55	55	61	62
20	57	57	57	57	67	67
	Compression Set, % (Same Conditions as Used in Previous Tables)					
20	32.4	29.1	31.6	32.6	37.2	37.4
30	26.1	25.8	28.6	28.8	31.8	33.2
			Mooney Scorch, MS @ 250° F.			
..	29.0	20.0	23.0	20.0	23.0	20.0
			Mooney Viscosity, MS 4 @ 212° F.			
..	17	21	23	26	49	51
			Extrusion Data (See Table 10)			
Rate, cc/min.	147.4	138.2	147.7	138.8	69.2	75.4
Die swell, %	105	99	89	78	14	15
Garvey index	10	12	16	15	16	16

*Total available sulfur 1.50 parts (maximum for non-blooming).
[a]J. M. Huber Corp.

compounding ingredients in cured and uncured butyl rubber necessitates entirely different compounding techniques than those used with other elastomers. Mixing of excess quantities of these materials in butyl rubber stocks results in "bloom." The work reported in this article shows that any sulfur in excess of the soluble sulfur and the "bound" sulfur during vulcanization will diffuse or migrate to the surface and show up as bloom, even at a high state of cure.

These studies also reveal that regardless of the sulfur source, whether from primary sulfur or from sulfur donors, if the total available sulfur exceeds 1.36 PHR., the compound will eventually bloom. To obtain maximum dispersion and solution of such compounding ingredients as sulfur, sulfur donors, accelerators, and plasticizers in butyl rubber compounds, the stocks must be mixed at temperatures in excess of the melting points of these ingredients.

The production of easy-processing mineral-filled butyl rubber stocks involves the determination of the best types of mineral fillers to use. These studies show that the ratio of the mineral fillers to one another greatly affects also the processibility and the physical properties

(*Continued on page 616*)

NEWS of the RUBBER WORLD

The Pettibone Advisory Committee on the Stockpile, appointed in late October by Defense Mobilizer Gordon Gray, expects to complete its report by the end of this month. No immediate change in the size or method of handling the 1.2 -million-ton rubber stockpile is considered likely, and concern about the effect of the report on the natural rubber market has subsided.

The Welsh Commission's program on Increased Use of Agricultural Products, which includes production of alcohol-butadiene from surplus grain, has been converted into legislation six months after the program was thought to have been abandoned. Disposal of the government's alcohol plant in Omaha, Neb., has consequently been deferred.

A "Little Federal Facilities Corp.," has been set up within the General Services Administration to handle disposal duties in connection with remaining synthetic rubber plants, such as the Omaha facility, and administration of lease contracts and mortgages.

The Department of Labor's survey of wages in the tire industry under the Walsh-Healey Act should be completed soon, and public hearings should get under way early this year. There is mounting pressure from rubber industry management to have this obsolete law repealed.

The Federal Trade Commission's proposed tire advertising guide is expected to be available for publication before the end of February. Industry reaction, mostly from dealers to date, has been favorable.

Rubber Manufacturers Association president Ross R. Ormsby expects the industry's 1957 dollar sales to surpass the 1956 record of $6.2 billion and sees further gains possible in 1958. General Tire's William O'Neil also expects a good 1958, with tire production amounting to 114 million units; while B. F. Goodrich's J. W. Keener thinks business in 1958 will equal or exceed 1957 totals. Thomas Robins, Jr., of Hewitt-Robins, Inc., predicts that the dollar sales volume of non-tire products will continue to grow at a faster rate than for tire products.

Rubber & Plastics Division, ASME, hears about new developments in belts for transporting materials and people; plastics houses; and new testing procedures. Wire and cable industry learns about compounding and processing rubber and plastics at U. S. Army Signal Engineering Laboratories' sixth annual symposium.

MEETINGS and REPORTS

ASME Rubber & Plastics Annual Meeting Papers on Design, Testing, New Materials

The Rubber & Plastics Division of the American Society of Mechanical Engineers held a two-day meeting in New York, N. Y., December 4 and 5 as part of the annual meeting of the parent Society. The papers presented at the four half-day technical sessions dealt with design of products from rubber and plastics, testing, and reports on developments of new materials.

The 1957 chairman of the Division, F. J. Wehmer, Minnesota Mining & Mfg. Co., presided at the luncheon-meeting of the executive and general committees on December 4, at which time he reported on the activities of the Division during the year and heard reports of the various committees of the Division.

The 1958 Division chairman, R. W. Barber, Panelyte Division, St. Regis Paper Co., and 1958 secretary, R. D. Stiehler, National Bureau of Standards, were introduced.

The technical sessions chairman for the 1957 annual meeting of the Division was Bryce Maxwell, assistant professor, Princeton University, and his summary of the papers presented at this meeting is the basis of our report.

Dr. Maxwell pointed out, first, that the mechanical engineers' interest in materials is motivated in the final analysis by utilitarian design considerations. This ultimate objective requires careful analysis of four areas of research and development, as follows: (1) study of successful examples of component design which emphasize the proper use of material properties; (2) study of new analytical representations of properties of materials with emphasis on the development of proper design criteria; (3) studies of test methods for determining design and fabrication properties of materials; (4) reports on the development of new materials.

All four of these areas were well represented in the 1957 Division sessions, he added.

"Designing Belts for Material Handling," by F. W. Blanchard, Hewitt-Robins, Inc., was cited as an example of successful application of materials to the solution of engineering problems. This paper presented a new breakdown of design factors in high-tension belt design, and an analysis of the determining characteristics in selection of belt cover materials, and vividly illustrated the important developments in new materials for belt carcass reinforcing materials which now rival the tensile strength of steel wire.

"The Development of a Passenger Belt Conveyor System," by P. W. Freitag, Goodyear Tire & Rubber Co., presented an imaginative and challenging solution to continuous transportation of people in the business areas of our large cities. Included in this paper were a careful study of the problem of moving people in densely populated areas, an engineering analysis which pointed out that the solution to this problem lay in a method of continuous *versus* batch operation, and a detailed research effort to find the physical, physiological, and psychological solution to the design of such a system which involved both human and material idiosyncrasies, and which latter was an illustration of the many facets inherent in the work of the engineer.

"The Development of Air Springs and Their Application to Automotive, Aircraft, and Industrial Uses," by H. H. Deist, Firestone Tire & Rubber Co., provided an excellent review of the development of these air springs and the results that have been achieved through their use. Here was another example of the solution of an important engineering problem through proper use of materials. Rubber with its elastic properties and permeability, and air with its compressibility characteristics, when properly combined in the fundamentally simple system of an air spring, produces a support with the desirable non-linear characteristics of (1) being soft in the normal range of uses to absorb shocks, but also (2) becomes progressively stiffer when compressed, thus absorbing normal jounce energy. In addition, such a system is readily adapted to levelizing so that the vehicle will maintain the same height from the road surface regardless of load.

"Rubber for Pivots in Heavy-Duty Vehicles," by M. O. Beck, Lord Mfg. Co., was described as an example of the solution of an engineering problem achieved by the application of less traditional materials to traditional problems. Elastomeric joints represent an economical solution to the problem of providing controlled flexibility between mating parts, with the added advantage of reduced maintenance. Although the basic design of pivots appears simple at first glance, proper performance is dependent on careful analysis of each application, it was added.

"Design and Evaluation of the Plastics House of the Future," by Robert P. Whittier, Monsanto Chemical Co., plastics division, was called a leading example of long-range engineering and development. The project staff recognized that the introduction of new materials and revolutionary design concepts in a basic industry such as housing requires sustained long-term effort. The success of such an effort is dependent upon the proper engineering design of the structure using these materials, Dr. Maxwell said.

Very exacting design analysis and load and thermal tests were performed on all structural elements prior to selection of materials for the finished house. The directors of this undertaking should be congratulated on their fundamental decision that plastics should be specified where they could offer advantage, and that structure components should not be imitative, but rather that the full engineering worth of these materials should be demonstrated, it was added.

"Prediction of Creep in Bending from Tension and Compression Creep Data When Creep Coefficients Are Unequal," by W. N. Findley, Brown University, J. J. Poczatek, Cook Research Laboratories, P. N. Mathur, Ford Motor Co., was a paper in the area of analytical engineering studies of materials and pointed the way to the solution of a problem that has plagued the engineer in design applications with time dependent materials.

Expressions have been developed for the prediction of creep and stress distribution in bending from creep data in tension and compression. The theory and resulting investigation demonstrates that the stress distribution and location of the neutral axis in a beam change with time when the tensile and compressive creep characteristics are different. Hence the simpler expressions of classical elasticity cannot be applied to these materials without the more detailed analysis presented in this paper.

"Tensile Behavior of Reinforced Plastic Laminations and Composite Plates," by R. L. Thorkildsen, General Electric Co., also demonstrates the utility of the analytical approach to materials problems. In order for composite materials

and orthotropic laminates to take their rightful place as engineering materials, expressions must be developed for the determination of their elastic properties in arbitrary directions.

The author has derived the expressions for elastic constants for several loading directions in orthotropic materials and then processed them through a computer to obtain graphical presentations of the relations between elastic constants, which greatly facilitates the calculation of stresses and deflections in design applications.

"A High Shear Rate Capillary Rheometer for Polymer Melts," by E. H. Merz and R. E. Colwell, Monsanto plastics division, demonstrated the importance of capillary geometry on the results obtained in extrusion rheometers. A great deal of data has been taken on the flow properties of polymer melts in many different kinds of rheometers, but in too many cases data on the same material obtained on different types of apparatus is not comparable.

Using an instrument of large L/D ratio the authors of this paper have been able to obtain data under conditions of shear rates and temperatures which are comparable with actual production extrusion conditions. The value of this technique was demonstrated by two examples of the solution of production problems by means of determining melt parameters in this apparatus.

"The Initiation of Necking and Its Effect on the Tensile Behavior of Polyethylene," by S. M. Skinner, Case Institute of Technology, reported on the role of temperature in the initiation of necking. The effect of rate of strain on maximum stress in the initial part of the stress-strain curve was studied and found to be consistent with the temperature dependence of the onset of necking. Proper understanding of this phenomenon must be taken into consideration in interpretation and reporting of strength tests.

"Simplified Plastics Testing Procedure," by H. J. Karam, Dow Chemical Co., suggested methods of testing and evaluation of new polymers without extensive expenditure and use of large quantities of materials. By means of inexpensive compression molds, sufficient specimens for a complete evaluation program can be obtained from 40 grams of material. Simplified test methods for tensile properties, impact strength, heat distortion, and melt viscosity have been developed which correlate well with standard test methods at great savings in equipment investment.

"Teflon 100X Perfluorocarbon Resin Properties and Applications," by J. C. Siegle, E. I. du Pont de Nemours & Co., Inc., polychemicals department, described a new material, a copolymer of tetrafluoroethylene and hexafluoropropylene, which combines the high-temperature characteristics of traditional Teflon with flow properties that permit molding in conventional equipment. Materials engineers have for a long time desired a material with the finished end-use properties of Teflon without the fabrication problems associated with polytetrafluoroethylene.

R. W. Barber, 1958 chairman

"3M Brand Fluoro-Rubber 1F4," by D. A. Stivers, J. F. Abere, L. J. Wallgren, Minnesota Mining & Mfg. Co., and P. J. Stedry, North American Aviation, Inc., presented data on a fluorinated polyacrylate. The high-temperature resistance of this material, even in the presence of fluids difficult to contain in rubber, was demonstrated, and the reinforcement of 1F4 with carbon black discussed.

"A Review of Developments in Plastics Engineering—1956-57," by E. E. McSweeney, Battelle Memorial Institute, emphasized that the strong growth pattern of the plastics industry has outstripped predictions. Polyethylene will soon be the largest-tonnage thermoplastic material used in the United States, with polyvinyl chloride second, and polystyrene third. Although the growth of thermosetting materials production has not been so great as for thermoplastic materials, some specific materials, particularly melamine, have strong increase potentials, Dr. McSweeney said.

Among new materials, polyformaldehyde, polycarbonates, and polypropylene are the most important, he added. Polypropylene is available from abroad, but domestic production will be available soon.

Washington RG's Decennial Plans

The Washington Rubber Group will mark its tenth anniversary on February 18, with a scheduled program of three outstanding speakers from government and industry who are expected to insure a record attendance of between 250 and 300 persons at the afternoon technical session and the decennial banquet. The afternoon session from 4:00 to 5:30 p. m. and the banquet at 7:30 will be held in the National Press Club ballroom, Washington, D. C. The reception will be held at 6:30 in the East Lounge of the club.

H. E. Humphreys, chairman of the United States Rubber Co., one of the rubber manufacturing industry's most fluent leaders, will be the decennial dinner speaker. Two scientists of international reputation will address the technical session. They are Ray P. Dinsmore, research vice president of the Goodyear Tire & Rubber Co., and Allen V. Astin, director of NBS.

The decennial committee, headed by by T. A. Werkinthin, the charter president, expects the exceptional character of the program to insure a large attendance of non-resident members of WRG as well as others in the rubber, chemicals, and plastics industries. Reservations should be addressed to A. W. Sloan, Atlantic Research Corp., 812 N. Fairfax St., Alexandria, Va.

An illustrated 48-page decennial brochure will take the place of the customary WRG directory and will contain a history of WRG activities. Special awards will be made to the 62 charter members of the organization.

Tour Nashau Corp.

The second meeting of the Elastomer & Plastics Group, Northeastern Section, ACS, was in the form of an afternoon plant trip to the Nashua Corp., Nashua, N. H., on November 19, when 120 members and guests were conducted through the manufacturing departments of this coated products company. Following the trip, a prepprandial hour and a dinner, attended by 100, were held at the Leyton House Hotel, nearby, with Vivian T. Stannett, professor of polymer chemistry, State University College of Forestry, Syracuse University, Syracuse, N. Y., speaking on "The Application of High Polymers to Paper."

Dr. Stannett discussed the technica. problems and the polymerization reactions involved in the incorporation of high polymers into paper beater machines and also as surface coatings applied to the finished web.

The technical meeting was presided over by Group Chairman Max Taitel, UBS Chemical Co.

Signal Corps Wire and Cable Symposium Well Attended

The sixth annual symposium on "Technical Progress in Communication Wires and Cables" was held at the Berkeley-Carteret Hotel, Asbury Park, N. J., December 3-5, under the auspices of the communications department of the U. S. Army Signal Engineering Laboratories, Fort Monmouth, N. J.

Despite the arrival of a blustering winter storm and record snowfall for the northeast area, symposium attendance was the highest ever, being estimated in order of 1,100 persons.

Committee Chairmen

Chairmen of the five technical sessions were M. G. Caine, Monsanto Chemical Co.; C. T. Wyman, Bell Telephone Laboratories; G. Hamburger, Copperweld Steel Co.; V. McBride, Plastic Wire & Cable Corp.; and E. J. Merrell, Habirshaw Cable & Wire Division, Phelps Dodge Copper Products Corp. Chairman and co-chairman of the symposium committee were H. L. Kitts and H. F. X. Kingsley, respectively, of the U. S. Army Signal Engineering Laboratories. In addition, R. Blain, of the U. S. Army Signal Communication Engineering Agency sat on the committee.

The opening-day welcoming address was given by Brig. Gen. Earle F. Cook, Commanding General of the Signal Engineering Laboratories.

Abstracts of Papers

Summaries of technical papers of interest to the rubber and plastics industries are given below.

"The Testing of Polyvinyl Electrical Formulations." G. W. Ashworth, J. R. Darby, W. E. Koerner, and R. H. Munch, Monsanto organic research department, St. Louis, Mo.

The authors, using a molded electrode test specimen, have developed a small-scale technique for evaluating plasticizer performance in polyvinyl chloride wire formulations destined for TW rating by the Underwriters' Laboratories.

"The molded electrode test specimen consists essentially of a sheet of copper foil embedded in PVC insulating compound. A tab of copper protrudes out of the test specimen to allow electrical connection to the copper foil above the immersion line so that the electrical resistance of the plastic composition can be measured."

The data obtained show that results obtained with the molded electrode technique provide an accurate estimate of expected performance of compounds or particular ingredients in wire extrusions.

The small sample size (84 samples can be tested in a 1½-by 2- by 1-foot bath), relatively simple equipment requirements, and the small immersion baths required recommend this technique for the study and control of the electrical quality of other ingredients of PVC electrical formulations in addition to plasticizers when long-term water-immersion performance data are needed.

"Some Aspects of the Stabilization of Vinyl Insulation." J. G. Hendricks and N. L. Cooperman, National Lead Co. research laboratories, Brooklyn, N. Y.

Volume resistivity of vinyl insulation is influenced by many factors, with the effect due to each factor being dependent upon the level of the other factors involved in the test or environmental situation. Because of this "interaction" among factors, it is suggested "that resistivity may be further enhanced, and optimum overall benefits can be derived from rebalancing other components and reinvestigating other possible materials in the new system."

"Extrusion of Fast-Curing Neoprene Wire and Cable Compounds." O. L. Simmons and C. E. McCormack, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

In order to eliminate the usual heat history of neoprene cable stocks before extrusion, the authors have conducted a number of successful experiments in adding the accelerator at the extruder.

"The method used consists in chopping the unaccelerated compound into small pellets, blending these in a tumbler with pellets of accelerator masterbatch and then feeding this blend into the extruder."

By using NA-22[1] (2-mercaptoimidazoline) and Permalux[1] (DOTG salt of dicatechol borate) in combination and in higher amounts than usual, very fast CV cures can be obtained. In a typical factory trial the normal CV speed of 150 ft/min. was increased to 300 ft/min., and still higher rates were indicated.

Extruders now being used by the cable industry for handling cold feed are capable of simultaneously mixing and extruding the pelleted stock.

"Compounding for Heat Resistant Insulations and Jackets." A. C. Rowley, R. T. Vanderbilt Co., New York, N. Y.

This paper is concerned with developing compounds to meet the Underwriters' Laboratories RHH cable designation. Three types of elastomers, IIR (Butyl), SBR, and CR (Neoprene W) were used in this compounding study. In the case of IIR and SBR rubbers, the method of attacking the problem was through an improvement of the curing systems. According to the author, elimination of GMF[2] (quinone dioxime) in butyl rubber compounds and elemental sulfur in SBR compounds by Sulfads[3] (dipentamethylene thiuram tetrasulfide, an accelerator containing 25% available sulfur) promoted with suitable secondary accelerators gave satisfactory aging compounds.

The first step toward improvement of Neoprene W compounds was an evaluation of combinations of antioxidants. This approach was later modified to include changes in the curing system, with Sulfads acting as a sulfur carrier. The author reports that Sulfads, when used in combination with zinc oxide and Thiate A[3] (a thiohydropyrimidine), has a marked effect on cure and physical properties of Neoprene W compounds and at the same time improves aging in the 121° C. air oven.

"Predispersed Accelerators in Rubber Compounds." John Ware, The Ware Chemical Corp., Westport, Conn.

An old compounding technique, dispersing active rubber chemicals in suitable plasticizers for easy incorporation into the rubber mix is reexamined with respect to cable and wire insulation compounding. In general, predispersing rubber chemicals makes them more active or efficient, but nevertheless safer to use. Dispersion of sulfur, according to the author, permits reduction in the amount needed to attain a satisfactory state of cure and at the same time improve the heat aging properties of the vulcanizates.

The author predicts a coming era of automation in the rubber industry and with it widespread use of predispersed accelerators.

"New Developments in Hi-Fax[4] Coverings for Wire & Cable." By W. P. Acton and W. O. Bracken, Hercules Powder Co., cellulose products department, Wilmington.

Stress-cracking resistance and thermal embrittlement of polyethylene are functions of both density and weight average molecular weight.

Stress-cracking resistance, as evaluated by Bell Telephone Labs procedure, is shown to increase with increasing molecular weight (decreasing melt index). The authors recommend type 1600 Hi-Fax for applications requiring moderate stress-cracking resistance and 1800 Hi-Fax for those applications requiring the ultimate in resistance to stress-cracking.

Previous workers have established that "heat-cracking" (determined according to ASTM[5] D 734-50T) is not

[1] Du Pont elastomer chemicals department.
[2] Naugatuck Chemical Division, United States Rubber Co.
[3] R. T. Vanderbilt Co.
[4] Hercules high-density polyethylene.
[5] American Society for Testing Materials, Philadelphia, Pa.

unique with high-density polyethylenes, but occurs with all types. At a given density, resistance to heat cracking improves with decreasing melt index. If melt index is held constant, however, resistance to heat-cracking becomes worse as the density is increased. Heat-shock or heat-cracking resistance of the 1600 series Hi-Fax at normal operating temperatures is reported to be at least comparable to that of 1-2 melt index low-density polyethylene.

"The Effect of Stock Temperature on the Physical Properties of Polythene[6] Coatings for Wire." J. A. Durno, Canadian Industries, Ltd., plastics division, New Toronto, Ont. Canada.

Tensile strength and elongation at break of low-density polyethylene coatings on wire are dependent upon the temperature which the polyethylene compound has attained at the time it comes into contact with the moving wire. In general, tensile properties improve with increasing temperatures for polyethylenes varying in melt index from about 0.4 to 7.00, for aged and unaged samples and for several cross-head insert designs.

A number of cross-head inserts of varying design were evaluated, and one was noted to improve tensile properties of the polyethylene coating such that the tensile specifications of the Canadian Standards Association and Insulated Power Cable Engineers Association weatherproof wire insulation specification were met at a significantly lower stock temperature than was necessary when other inserts were used.

Factory trials made on commercial extrusion equipment substantiate this laboratory evaluation.

"Evaluation of Carbon Black Dispersions in Polyethylene to Predict Weatherability." R. M. Schulken, G. C. Newland, J. W. Tamblyn, Tennessee Eastman Co., Kingsport, Tenn.

The use of carbon black in polyethylene to protect the plastic from the deteriorating effects of sunlight has now become standard practice. The importance of a thorough dispersion of the carbon black to obtain maximum protection against weathering is obvious, and the authors propose in this paper a method which gives a quantitative measure (absorption of white light) of the effectiveness of such dispersions.

On the basis of correlations between Weatherometer[7] data and absorptivity of white light, it appears that a carefully standardized absorptivity measurement at a fixed film thickness can give a useful prediction of the weatherability of polyethylene pigmented with carbon black.

"Bulk Handling of Polyethylene in Cable Manufacturing." M. G. Dinsmore, Jr., Western Electric Co., Inc., Baltimore, Md.

This paper describes two large-scale polyethylene handling systems. The most complicated of the two involves the handling of 11 different colors of polyethylene, with each color to be conveyed to one to six extruders. Individual machine consumption is estimated at 100-150 pounds per hour.

Extensive use is made of United States Rubber Co.'s "Sealdbin-300" collapsible containers for receiving and storing the polyethylene. A series of pneumatic conveyors transports the polyethylene from the Sealdbins to the extruders.

A detailed description of the conveyor system and auxiliary equipment is given in the paper.

"Techniques for Insulating Wire and Cable with Silicone Rubber." D. C. Youngs, D. J. Badamo, M. N. Culver, Dow Corning Corp., Midland, Mich.

In an effort to reduce the labor of hand-feeding silicone rubber into the extruder, a mechanical roller feeding system has been developed. The silicone compound is cut from the mill in the form of a strip and wound on a hat; the roller feed then takes the strip directly from the hat.

In conjunction with their study on mechanical feeding, the authors evaluated several extruder screw designs. Their experience indicates that "a single flight, decreasing pitch screw with a compression ratio of about 3 to 1 seems to give best all-around performance with silicone rubbers."

The effect of preheating conductors on hot air CV rates was also explored, and the conclusion reached that "extrusion speeds can be increased greatly by preheating the conductor to 300 to 400° F."

The use of semi-vulcanized silicone rubber tape in power cable insulation was also discussed.

"Controlled Pressure (Valve) Extrusion." B. H. Maddock, H. J. Nalepa and B. Turkoff, Bakelite Co., Division of Union Carbide Corp., New York, N. Y.

This paper reviews the fundamental principles involved in controlled pressure (valve) extrusion and shows how these principles can be used in various applications.

"The technique of valve extrusion is based on the fact that quality is improved by increasing the operating pressure in the extruder."

Continuous control of pressure over a wide range is obtained by a valve installed between extruder screw and die. Several designs of valves were discussed. The success of this new extruding technique is illustrated by the extrusion of dry vinyl blends with commercial acceptable quality.

Another important aspect of pressure valve extrusion is that it tends to make a given extruder screw more universally applicable to different products.

"The Extrusion of Teflon 100X Perfluorocarbon Resin, a New Melt-Extrudable Material for Wire Insulation." R. E. Stabler, Du Pont polychemicals department, Wilmington.

Teflon 100X perfluorocarbon resin is a new melt-extrudable material with the following properties: capable of continuous service at 200° C.; tough and strong over a range of temperatures from —200 to +225° C.; resists chemical attack of all chemicals and solvents up to 200° C.; non-flammable; excellent weather and ozone resistance; essentially zero water absorption; and excellent dielectric characteristics over a wide range of temperatures and frequencies.

Although conventional extruders may be used for processing, they should be electrically heated and capable of operating up to 800° F.

Byard Ontario Speaker

The December meeting of the Ontario Rubber Group was held at "The Pines," Hamilton, Ont., on December 10. Attendance of more than 130 members and guests from Toronto, Hamilton, Kitchener, and surrounding areas set a record for out-of-town meetings. The social gathering, courtesy of the suppliers, was much enjoyed and preceded the banquet dinner.

Ken Byard, vice president in charge of manufacturing, Dunlop Canada, Ltd., was introduced to the meeting by Frank Garry, also from Dunlop Canada. Mr. Byard spoke on "The Technical Man in Other Countries," basing his remarks on his personal experiences in the several countries where he had served.

With the establishment of one new rubber-company branch factory each year in a country other than the United States or Europe, there were many opportunities for the younger technical man to serve away from the home factory.

Mr. Byard reported that living and working in such areas as India, Europe, and South Africa required adjustment to the climate, the people and their beliefs, and the technical and social standards.

Gordon Syme, Firestone Tire & Rubber Co. of Canada, expressed the thanks of those present to Mr. Byard for his very interesting talk.

Alex Jaychuck announced on the behalf of the executive committee of the Division of Rubber Chemistry, Chemical Institute of Canada, that the Division convention would be held in Toronto at the Royal York Hotel on May 28.

[6] Canadian Industries low-density polyethylene.
[7] Atlas Electric Corp.

SRG Meeting on Adhesion, SQC, Rubber Grading; First Harmon Connell Scholarship Presented

The fourth meeting of the Southern Rubber Group was held at the Hotel Peabody, Memphis, Tenn., November 15 and 16. It was featured by panel discussions on "Adhesion and Adhesives" and on "Statistical Quality Control and Rubber Grading." Registration totaled 279 representatives of the rubber industry and 60 wives and set a record for attendance for SRG meetings.

The banquet on the evening of November 15 attracted 350 members and guests. J. R. Galloway, E. I. du Pont de Nemours & Co., Inc., acted as master of ceremonies and introduced E. T. Skinner, Skinner Bros. Co., who took as his subject, "You Too Can Be a Millionaire." Lenoir Black, C. P. Hall Co., and a member of the Group's educational committee, presented the first Harmon Connell Memorial Scholarship of $500 to Leslie Drane, Jr., a senior at Mississippi State College. This scholarship was organized and financed by members of the Group in memory of the late Harmon (Red) Connell, Armstrong Tire & Rubber Co., the first chairman of the Group and the man most active in its formation.

Other features of this two-day meeting were attendance at the Tennessee-Ole Miss. football game, November 16, and a suppliers' hospitality room.

Lenoir Black, SRG educational committee *(left)*, presenting the scroll of the first Harmon Connell Scholarship to Leslie Drane

Business Meeting

At a business meeting the SRG passed an amendment to change the end of the year for the Group from November 1 to July 1. New officers will take over at the conclusion of the spring meeting instead of just before the fall meeting. Dates and places for future meetings were announced as follows: February 21, 22, 1958, Shamrock Hotel, Houston, Tex.; June 13, 14, Dinkler Plaza Hotel, Atlanta, Ga.; October 17, 18, Roosevelt Hotel, New Orleans, La.; January 30, 31, 1959, Statler Hotel, Dallas, Tex.; and June, 1959, Desert Ranch Motel, St. Petersburg, Fla.

Adhesion Panel

The first panel discussion, on "Adhesion and Adhesives," had as its modrator Harold Gross, General Adhesives Co. The panel included Frank H. Wetzel, Hercules Powder Co., who discussed the theory of rubber adhesion, with emphasis on rosin and rosin adhesives in pressure-sensitive adhesives.

The second speaker of this panel was E. L. Borg, Naugatuck Chemical Division, United States Rubber Co., who dealt with "Latex Tire Cord Adhesives" and pointed out that new tire cord materials and tire constructions have complicated the problems of tire cord adhesion. Lee L. Blyler, Howe & French, Inc., discussed "General Adhesive applications, with Emphasis on the Shoe, Flooring, and Automotive Industries," and described the difference between mechanical and specific adhesion and stressed the importance of proper compounding to get specific adhesion.

S. L. Brams, Dayton Chemical Products Laboratories, spoke on "Rubber-to-Metal Bonding—A 1957 Inventory," in which he reviewed the importance of metal preparation, adhesion methods, compounding, and testing, but concluded that rubber-to-metal bonding still cannot be reduced to an exact science.

SQC and Rubber Grading Panel

The moderator for the panel which covered both statistical quality control and rubber grading was J. H. Sparks, Robbins Floor Products Co. O. R. Weaver, Phillips Chemical Co., spoke on "An Introduction to the Theory of Quality Control" and discussed the laws of probability and how they can be applied to quality control in the rubber industry.

Leonard Freeman, The B. F. Goodrich Co., described "A Method for the Application of Statistical Quality Control in the Manufacture of Rubber Products," with reference to how Goodrich applied SQC to its plants throughout the world. He showed how SQC helps technical people pinpoint problems and provides engineers with information for the improvement of specifications and processes.

Sid J. Pike, S. J. Pike Co., described "Rubber Grading," by means of numerous colored slides which illustrated the actual production and grading of plantation and native rubber in the Far East.

More complete details of these panel discussions and the questions and answers which followed them will be published in a forthcoming issue of RUBBER WORLD.

Knowland at Tlargi

The Los Angeles Rubber Group, Inc., had a dinner-meeting honoring the past chairmen of the Group, (known as members of Giltipsey) at the Biltmore Hotel, Los Angeles, Calif., November 5. The guest speaker, Senator William F. Knowland, addressed 305 members and guests on the subject, "The Senator Reports."

The Senator's speech followed the initiation into GLTPC (Giltipsey) of L. E. Budnick, Ohio Rubber Co.; F. C. Johnston, Caram Mfg. Co.; and C. S. Hoglund, R. D. Abbott Co.; under the auspices of E. L. Royal, H. M. Royal, Inc.; and A. L. Pickard, Braun Corp. Senator Knowland's remarks covered two main topics: First, he explained his attitude toward the Russians as being a result of following them and their promises through the past 30 years in which time they had not held sacred, nor had they honored one agreement with any nation with whom they had signed up, regardless of where, when, or under what circumstances. Therefore they are not to be trusted today. The other part of his report covered, in some detail, his fundamental labor policy.

At the technical session, attended by 80, Raymond P. Allen, consultant in industrial microscopy, illustrated by the use of slide pictures of microscopic examination of various rubber articles the source of many factory troubles and the manner in which the microscope could be used to detect the cause of the troubles.

Nominees for the officers and directors of Tlargi for 1958 were announced by the nominating and election committee.

Revised by-laws for the Corporation were read and voted upon and passed by a large majority. Significant changes were: (1) increase in board of directors from nine to 12 men; (2) description of several classes of membership together with the dues payable for each class of membership; (3) increase of dues and initiation fees from $5 for each to $10 initiation fee and $10 per year dues.

Announcement was made of the passing of Tlargi photographer and honorary life member A. R. Hromatka, who during the past 16 years was responsible for the Group's photographic work.

Tuley Addresses Rhode Island Rubber Club

William F. Tuley, Naugatuck Chemical Division, United States Rubber Co., addressed 220 members and guests at the annual fall meeting of the Rhode Island Rubber Club at the Pawtucket Country Club, Pawtucket, R. I., November 7, on "The Future of the Rubber Industry." The technical session preceded a dinner where officers for 1958 were elected and where Harrison Loeser, General Dynamics Corp., Groton, Conn., illustrated his talk with a movie depicting some of the details of the construction of atomic powered submarines as well as their performance.

Dr. Tuley, in his discussion, was concerned with factors with which technical men of the rubber industry will have to deal in the future. He related how the rubber industry is connected with the service, industrial, and military facilities of our present culture, in particular, the functions of elastomeric products in the modern communications and transportation systems, and the rubber industry's significance as a consumer of products of the chemical industry.

In connection with the rubber industry as a consumer of chemical products, the speaker referred to a 1956 discussion presented by Naugatuck Chemical's G. R. Vila to an ACS meeting. It was reported that the tire industry, using about 60% of total rubber consumed in all products, used in 1955, 4.224 billion pounds of chemicals. Of this total, 1.169 billion pounds were used directly in tire rubber compounding. Another 1.327 billion pounds were used in the manufacture of synthetic rubber that went into tires. Finally, 1.728 billion pounds were used in producing rayon and nylon tire cord fabrics. These quantities used only for tires may be increased by more than 50% to cover the entire rubber industry's chemical consumption.

Commenting on other factors contributing to the importance of the rubber industry, Dr. Tuley mentioned the properties of rubber products, themselves, such as elasticity, resilience, wear resistance, ability to maintain useful properties over a wide range of temperature, long performance life, and resistance to chemical agents.

He reported that plastics have moved into many products formerly using only rubber as the elastomeric part. Examples include: polyvinyl chloride coated fabrics, plastic garden hose, polyethylene and nylon insulated wire, PVC plastic waterproof footwear, and plastic toys.

A particularly active development at this time is in combinations of some of the synthetic elastomers and plastics, as the use of elastomers to increase the toughness and flexibility of plastics such as the phenolic resins and polystyrene. In this case the rubber is usually not vulcanized. Also, there is a very rapid growth in the so-called gum plastics which are special synthetic rubber-resin compositions with exceptionally high impact resistance.

Major technical changes foreseeable for the rubber industry include: process and equipment improvements, new materials, particularly new rubbers, and new products. More specifically, in all mold curing operations a shorter curing cycle giving increased mold and press usage will reduce equipment requirements and costs and permit the use of more active accelerators.

Some of the new materials entering the rubber industry are nylon tire cord, butyl rubber in tires, and polyurethane elastomers. Nylon has found use because it is stronger on a weight basis and resistant to moisture, despite that the total manufacturing cost of nylon tires is said to be a minimum of 5% more than for comparable rayon tires. It was estimated, however, that nylon will be used in 35% of the truck and bus tires and in 40% of the replacement passenger-car tires in 1957.

New products will contribute to the future of the rubber industry. Two such new products are the storage and shipping containers of large size made from textile cord and rubber, and air springs for buses and cars, which are coming into extensive use.

At the dinner the following officers were elected: chairman, W. K. Priestly, Kaiser Aluminum & Chemical Co.; vice chairman, H. W. Day, E. I. du Pont de Nemours & Co., Inc.; secretary-treasurer, H. L. Ebert, Firestone Tire & Rubber Co.; director, one year, W. Blecharczyk, Davol Rubber Co.; director, two years, E. C. Uhlig, U. S. Rubber; director, three years, R. B. Robitaille, Phillips Chemical Co.; director, four years, J. Vitale, Crescent Co.; and director, five years, Clement Damicone, Acushnet Process Co.

President Eisenhower's talk, "Science and Security," was piped through the P. A. system during the latter part of the dinner.

Philadelphia RG Dance

The annual fall dance of the Philadelphia Rubber Group was attended by approximately 240 members and guests. The dance was held on November 22 at the Manufacturers Golf & Country Club, Oreland, Pa. Music was furnished by Bill Davies and his orchestra.

The committee in charge of arrangements for the dance consisted of: T. W. Elkin, R. T. Vanderbilt Co.; R. B. Carroll, R. E. Carroll, Inc.; A. L. Shaw, The B. F. Goodrich Co.; and A. J. DiMaggio, Firestone Tire & Rubber Co.

One of the special features was the awarding of approximately 20 draw prizes to the ladies present. Thanks to contributions from suppliers, the cocktail bar was open to all without charge. Included in the price of the ticket was a midnight meal served by the Country Club catering staff.

This fall dance is the last event of the 1957 Philadelphia Rubber Group calender.

Group Offers Course

The Villanova University Graduate Division in cooperation with the Philadelphia Rubber Group will offer a course in Basic Rubber Technology during the spring semester. This course is intended for men who possess a potential for future sucess in the rubber industry. Class size will be limited.

The course will be taught by Aaron Back. Total cost for this course exclusive of text books will be $46. Details follow: course: CH. E. 581E-Basic Rubber Technology; day: Monday; first class meeting: February 10, 1958; time: 7:40 to 9:30 p.m.; place: Chemical Engineering Building; fees: $46.00; credits: 2 graduate credits; audit: 0 credit; registration: February 3, 4, and 5.

NCRG Course Given

The Northern California Rubber Group presented a course, Elementary Rubber Technology, which was given Tuesday evenings during the period of September 24 to November 26 at Dwinelle Hall on the campus of the University of California, Berkeley. This course, under the sponsorship of the Department of Chemical Engineering of the University, consisted of ten lectures, each presented by a different member of the Rubber Group. About 55 persons attended, most from the Bay area industries.

SPE Technical Program

The most comprehensive technical program ever devoted to plastics engineering will be presented at the fourteenth annual technical conference of the Society of Plastics Engineers, Inc., to be held at the Sheraton-Cadillac Hotel, Detroit, Mich., January 28-31.

The 102 papers scheduled for 26 sessions by the speakers committee, of which William C. Goggin, The Dow Chemical Co., is chairman, exceeds by 25% the number presented at any previous annual conference. In developing the programs, Mr. Goggin and his committee have attempted to cover every significant segment of plastics technology and of the plastics industry. More than 3,000 members and guests are expected to attend the conference.

CRG Hears Sears; Party Most Successful

The Chicago Rubber Group devoted its November 15 meeting at the Furniture Mart in Chicago, Ill., to the Rubber Manufacturers Association, Inc., with RMA vice president, W. J. Sears, speaking on "The RMA—An Industry Service Organization." About 180 members and guests were present at this meeting.

The Christmas party and ladies' night was held December 20 in the Morrison Hotel and was one of the most successful in the history of the Chicago Group.

RMA Night

Mr. Sears explained that the RMA was a non-profit corporation, organized in 1915 under the laws of the State of New York. Membership is limited to companies who consume rubber in the manufacture of an end-product, amounting to about 165 member companies at present, which in the aggregate account for well over 90% of the total rubber consumed in the United States. There is an 18-man board of directors, who are annually elected by the membership for staggered three-year terms. Officers of the Association are elected by the board of directors and are employed by the RMA and work fulltime on RMA matters. The staff headquarters are in New York, N. Y., with a branch office in Washington.

It was explained further that the activities of the RMA are organized into two main categories. First, it is a federation of semi-autonomous product divisions; and secondly, it functions through industry-wide service committees.

The product divisions are the Tire Manufacturers, Mechanical Rubber Goods, Rubber Footwear, Heel and Sole, Rubber Flooring, Rubber Sundries, and Coated Materials. Each of these product divisions maintain executive committees and other committees as the need arises. Each of them also has technical committees which develop industry-wide product specifications in cooperation with organizations such as the military services and other government procurement agencies, and with various professional and technical societies and associations.

The programs and meetings of these product divisions are not limited to members only, but often are attended by representatives of non-member companies.

The RMA's industry-wide service committees consist of general accounting, statistical, tax, manufacturing, crude rubber, traffic, and public relations.

Mr. Sears described in some detail special activities of the RMA in the fields of tariff rates on rubber products, development of a common "language" for producers and users of molded, extruded, lathe-cut, and chemically blown sponge rubber parts, and natural rubber packing and grading.

Christmas Party

More than 850 members and guests were present at the Group's Christmas party on December 20. The program consisted of a cocktail hour and dinner followed by a program of night club and television acts and dancing. A leather week-end case was presented to each of the ladies, with the compliments of the Group.

The committee in charge of this affair was headed by Jim Moore, Roth Rubber Co., with Ted Argu, of the same company, as vice chairman.

Groups' Christmas Fetes

Latin Quarter for N. Y.

The New York Rubber Group held its Christmas party at the Latin Quarter, New York, N. Y., and 578 members enjoyed a fine dinner and Latin Quarter show featuring "Mr. Television," Milton Berle. Every member present received a table favor in the form of a monogramed billfold, and several portable television sets and transistor radios were also distributed to the holders of lucky numbers. These prizes and favors were made possible by generous contributions received from many supplier and rubber companies.

H. J. Due, St. Joseph Lead Co., retiring chairman, expressed his appreciation to the officers, directors, and committee members for their help during his term of office and then introduced the new officers for 1958, as follows: chairman, C. V. Lundberg, Bell Telephone Laboratories; vice chairman, R. B. Carroll, R. E. Carroll, Inc.; secretary-treasurer, M. E. Lerner, *Rubber Age;* and sergeant-at-arms, F. T. Raba, Triangle Conduit & Cable Co. New directors of the Group for 1958, who were also introduced by Mr. Due were the following: L. C. Komar, Titanium Pigments Corp.; L. J. Koch, Westwood Chemical Co.; D. B. Doherty, Godfrey L. Cabot, Inc.; and R. M. Glidden, Ames Rubber Co.

The innovation of holding the Group Christmas party at the Latin Quarter met with almost unanimous approval by the membership and will probably be repeated next year.

Record Crowd at Boston

The annual Christmas party of the Boston Rubber Group, held December 13 at the Somerset Hotel, Boston, Mass., drew a record crowd of 680 members for the usual cocktail hour and dinner that followed.

Retiring Chairman Arthur I. Ross, American Biltrite Rubber Co., introduced Ralph B. Huber, Ralph B. Huber, Eng., teller's committee chairman, who announced the election of John M. Hussey, Goodyear Tire & Rubber Co., as the new executive committee member. In accordance with recently adopted by-laws, this office was the only one to be filled; each higher office is now filled by automatic succession. Officers for the coming year, therefore, are as follows:

Chairman: Roger L. Steller, B. F. Goodrich Chemical Co.; vice chairman: William H. King, Acushnet Process Co.; secretary-treasurer: James J. Breen, Barrett & Breen Co.; historian: Harry Atwater, retired; executive committee: Mr. Ross, Thomas C. Edwards, Acushnet Process Co., George E. Herbert, Tyer Rubber Co., Mr. Hussey, and Charles S. Frary, Jr., Boston Woven Hose & Rubber Co.

Mr. Breen, ski committee chairman, announced the annual Boston Rubber Group ski outing week-end for February 7-9 at the Bartlett Hotel, Bartlett, N. H., with reservations rapidly reaching the 100 limit.

Ticket prizes were made to about 180 of the members, after the evening's entertainment program, which featured vaudeville acts.

Buffalo Group's Party

Approximately 250 members and guests of the Buffalo Rubber Group attended the annual Christmas party held on December 3 at the Town Casino, Buffalo, N. Y. Festivities included cocktails, dinner, a floor show, introduction of the newly elected officers for 1958, and presentation of a gift to everyone attending. The following officers were elected: chairman, John Helwic, Dunlop Tire & Rubber Co.; vice chairman, Richard Herdlein, Hewitt-Robins, Inc.; and secretary-treasurer, Lawrence Halpin, Dunlop. Elected to the executive committee were Eugene Martin, Dunlop, and Robert Prior, Hewitt-Robins.

Working Group, Proposed EIMA Meets in New York

The need of improving the flow of information on existing and new electrical insulating materials was agreed on at a two-day meeting held in New York, N. Y., December 10 and 11. Called by the working group of the proposed Electrical Insulating Materials Association, it was attended by representatives of technical societies, trade associations, and the working group on December 10. On December 11 a meeting comprised principally of representatives of manufacturers of electrical insulating materials was held at the Barbizon-Plaza Hotel.

All present agreed that it was important that end-users of electrical in-

sulating materials be given more and better information on insulation than is now available. At the conclusion of the meeting it was overwhelmingly voted that the working group should continue its efforts and assist various technical societies and trade associations to carry out the purpose of the scope discussed.

Additional information about the organization may be obtained from the Electrical Insulating Materials Association, P. O. Box 1312, Grand Central Station, New York 17, N. Y.

N. Y. Elastomer Course

As announced in the last issue of RUBBER WORLD (page 420) the New York Rubber Group is sponsoring a 15-lecture course in Advanced Elastomer Technology, beginning February 18. The third and subsequent lectures will be held on Mondays at the Engineering Societies Building, 29 W. 39th St., New York, N. Y., from 7:30-9:45 p.m.

The scheduled lectures and lecturers, where available, are as follow: February 18, "Characteristics of Rubber-Like Materials," Wm. Slichter, Bell Telephone Laboratories; February 25, "Molecular Structure," H. Mark, Polytechnic Institute of Brooklyn; March 3, "Characteristics of High Polymers," A. M. Bueche, General Electric Co.; "Synthesis of High Polymers," J. A. Davison, United States Rubber Co.; March 24, "Mechanical Behavior of High Polymers," T. Alfrey, Jr., Dow Chemical Co.; March 31, "Reinforcement," W. R. Smith, Godfrey L. Cabot, Inc.; April 7, "Vulcanization," D. Craig, The B. F. Goodrich Co.; April 14, "Fluorocarbon Polymers," J. F. Abere, Minnesota Mining & Mfg. Co.; April 21, "Cis-1,-4 Polyisoprene and cis-Polybutadiene"; April 28, May 5, 19, 26, June 2, Compounding, Fabrication Techniques, and New Developments in the Following Phases of the Rubber Industry: "Tire, Mechanical Goods, Wire and Cable, Floor Coverings, Footwear, Sponge and Foam Products, Cements and Adhesives, Sundries, Etc."; and June 9, "Physics of Color," L. Wurtzburg, Interchemical Corp.

Applications for registration will be mailed to the membership during January; non-members may obtain registration forms by writing L. C. Komar, Titanium Pigment Corp., 99 Hudson St., New York 13, N. Y., chairman of the Group's educational committee. The fee for members is $25.00; non-members, $28.00.

CALENDAR of COMING EVENTS

January 24
Akron Rubber Group. Sheraton-Mayflower, Akron, O.
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.

January 27-30
Plant Maintenance and Engineering Show and Conference. International Amphitheatre, Chicago, Ill.

January 28-31
Society of Plastics Engineers, Inc. Fourteenth Annual Technology Conference. Sheraton-Cadillac Hotel, Detroit, Mich.

January 31
Chicago Rubber Group.

February 4
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

February 7-9
Boston Rubber Group. SKI Outing. Bartlett Hotel, Bartlett, N. H.

February 10-14
American Society for Testing Materials. Committee Week. Hotel Statler, St. Louis, Mo.

February 13
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

February 18
Washington Rubber Group. Decennial Meeting. National Press Club, Washington, D. C.

February 21
Connecticut Rubber Group. Monero's Restaurant, Orange, Conn.

February 21-22
Southern Rubber Group. Shamrock Hotel, Houston, Tex.

March 4
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

March 14
Chicago Rubber Group.

March 28
New York Rubber Group. Henry Hudson Hotel, New York, N. Y.

April 1
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

April 10
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

April 11
Akron Rubber Group. Spring Meeting.

April 13-18
American Chemical Society. National Meeting. San Francisco, Calif.

April 14-17
Design Engineering Show and Conference. International Amphitheatre, Chicago, Ill.

April 16
Washington Rubber Group.

April 20-23
American Institute of Chemical Engineers and The Chemical Institute of Canada. Chemical Engineering Conference. Montreal, P.Q., Canada.

April 25
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Chicago Rubber Group.

May 6
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

May 12-14
Eighth Canadian High Polymer Forum. National Research Council of Canada and Chemical Institute of Canada. MacDonald College, Quebec, P.Q., Canada.

May 13-16
Division of Rubber Chemistry, American Chemical Society. Netherlands-Plaza Hotel, Cincinnati, O.

May 21
Washington Rubber Group.

May 28
Division of Rubber Chemistry, Chemical Institute of Canada. Convention. Royal York Hotel, Toronto, Ont., Canada.

June 5
New York Rubber Group. Outing. Doerr's Grove, Milburn, N. J.

June 6
Fort Wayne Rubber & Plastics Group. Summer Outing.

June 13-14
Southern Rubber Group. Dinkler Plaza Hotel, Atlanta, Ga.

June 20
Akron Rubber Group. Summer Outing.

WASHINGTON REPORT

By ROBERT E. L. ADAMSON

Pettibone Stockpile Report Indicates No Reduction in Rubber Planned Now

The Pettibone Advisory Committee on the Stockpile reported rapid advances in its preparedness study for the Office of Defense Mobilization in December, amid growing speculation within the rubber industry that any change in the size of the natural rubber inventory was, at least, a long way off. Formation of the Committee by Defense Mobilizer Gordon Gray last fall had been followd by an undercurrent of anxiety that the Committee might recommend a substantial reduction in the rubber stockpile, with consequent pricing problems in the rubber industry.

Repeated public statements, however, indicating the emphasis was on the possibility of adding finished products to the stockpile, plus a reeducation on the difficulty of setting up a stockpile disposal program, appeared to buildup an industry feeling that the 1.2-million-ton rubber inventory of Uncle Sam's would continue to gather dust for some time. (Note: As shown in the other stockpile story in this month's Washington Report, some 3,000 tons of rubber monthly are rotated out of the stockpile to keep the supply at top quality.)

New Stockpile Items Needed?

The Stockpile Advisory Committee, headed by Holman D. Pettibone, former chairman of the Rubber Producing Facilities Disposal Commission, reported "quite a bit of progress" into the Christmas holidays. The group was organized in late October to start from scratch on the crucial question of United States preparedness to meet hot- and cold-war emergencies and to recommend the areas in which the U. S. has failed to ready itself. Of course, a corollary question to any reappraisal of mobilization policy concerns the possible oversupply of any stockpiled item which is no longer necessary, but ODM Chief Gray does not need a civilian advisory committee to tell him that an item is no longer needed—the Pentagon can be counted upon for advice of this sort. So the essential question posed was this: Do the modern possibilities of warfare require the storage of items like food, medicine, and finished products for maximum survival and rehabilitation ability?

Or, as Gray himself put it in addressing the Economic Club of Detroit:

"Today we have over six billion dollars worth of material in the stockpile which, in World War II or Korean terms, gives us very substantial protection against loss of supplies and emergency demands.

"But this protection may not be the right kind of protection in a mobilization where time and space have disappeared (little time to retaliate from a surprise attack and no longer the security from attack provided by long distances from the enemy). It is beginning to be frequently argued that, in any event, we should now stockpile various kinds of machinery and equipment, machine tools, and even consumer goods essential for survival.

"Those who take this approach point out that all the (raw) materials in the world are useless without the tools and the labor force to process them. Further, apart from any new and specialized materials which might be added to the stockpile there is the question of paying for, managing, rotating, and maintaining this enormous inventory—along with the problem of disposing of any of it if circumstances warrant. Thus it is that preparedness from the standpoint of materials by yesterday's standards may not measure up to tomorrow's demands.

"The possibility of massive (nuclear) attack greatly compounds our difficulties and poses new production problems. After a nuclear attack not only would there be a great loss in production facilities, but there also would be a great difference between undestroyed production capacity and actual production capability. Some undamaged plants with power and labor still available would soon find operations impossible because of breaks in the chain of supply.

"The reestablishment of these chains of production is one of our most difficult planning problems. Even today before preparedness is complete, businessmen can make a contribution to mobilization readiness by considering alternate sources of supply, by storing engineering drawings, blueprints, plant layouts, and other vital records in relatively safe places, and by providing for the continuity of management. They might also look into possibilities of protective construction and dispersion of inventories of key items."

Report Near Completion

The Pettibone Committee was selected to give Gray a wide variety of expert advice in key areas of any preparedness program—food, production, medicine, mobilization, minerals, metals, military, financial, science (research and development), and chemicals. In getting down to work, Chairman Pettibone assigned each of the specialists in these fields to prepare a basic policy paper in his field. Every second or third week since the end of October, the Committee has met to criticize the papers, approve them, or return them to the authors for modification. Each paper must get Committee endorsement before it is allowed to stick. As these papers are approved, they go into the recommendations base from which will be drawn the prime points of advice for Gray.

As of late December, RUBBER WORLD was told, the Committee was on or ahead of schedule and confidently expected to wind up its task this month. Gray will have to take it from there.

Revived Grain-Alcohol Program Opposed

The bold alcohol-butadiene program informally proposed last spring by the Welsh Commission on Increased Industrial Use of Agricultural Products returned to plague the Administration in December, six months after it was thought to have been buried. Sen. Carl T. Curtis, a Nebraska Republican and member of the Midwest farm bloc, demanded that the General Services Administration delay plans to dispose of a government-owned alcohol plant at Omaha because it might be needed if Congress approves the Welsh plan.

Under the plan, alcohol produced from surplus grain would be shipped to the butadiene plants at Louisville, Ky., and Kobuta, Pa., and the butadiene thus produced would be inserted into the stream of commerce—specifically to the makers of synthetic rubber, paint, and plastics.

Criticism of Curtis Proposal

The whole idea of government competition with the private suppliers of these product manufacturers was enough to bring a torrent of criticism against the Welsh proposal from every interested Executive agency. In addition to the government competition objection, it was pointed out to Congress that wartime production of butadiene from alcohol had already demonstrated that grain alcohol could not compete with petroleum as a butadiene feed material unless the grain was supplied at relatively nominal cost.

Nevertheless the Welsh plan caught the fancy of the Senate farm bloc and Senators Curtis and Paul Douglas (Democrat, Ill.) converted the proposal into proposed legislation. The Senate Banking Committee, which has jurisdiction over the Curtis-Douglas bill, has not scheduled it for hearing, but it could come for consideration during the session which began earlier this month.

While the Banking unit is deciding whether to study the bill—and while the Senate Agriculture Committee considers a much broader program for boosting farm produce consumption—Senator Curtis wants GSA to postpone disposal of the Omaha plant. His plea to GSA Chief Franklin G. Floete for a stop-order on Omaha brought this terse public reply:

"We have informed certain interested members of Congress that we will defer disposal (of Omaha) at the request of the chairman of any committee of Congress which has before it for consideration legislation involving the utilization or disposal of the plant."

New Bill Planned

Curtis would like to have Sen. Allen Ellender (Democrat, La.), chairman of the Agriculture Committee, make the request for deferral. As of last month, however, Ellender's committee had no legislation before it "involving the utilization or disposal of the plant." So Curtis was planning to introduce a new bill which would fit this requirement, then have it referred to the Ellender committee. This move would have the twofold effect of (1) holding up disposal of the Omaha facility, and (2) putting consideration of the alcohol-butadiene plan before a committee which has a far greater interest in the consumption of grain than does the Banking committee.

The appeal of the Welsh plan to the farm bloc is readily understood in terms of the huge amounts of surplus grain it would require to push the program at full speed—some 68 million bushels annually. The grain would be converted to alcohol in up to 10 plants under government or private ownership and shipped to the government alcohol-butadiene plant at Louisville, as well as the privately owned alcohol-butadiene facility at Kobuta. The latter is subject to recall by the government under a national security clause in the sale contract. The combined output of Louisville and Kobuta would put almost 180,000 tons of butadiene into the domestic and/or foreign markets.

No Stockpile Problems; Low Grades Eliminated

The Federal Government's rubber storehouse keeper, George Casto, director of the Project Administration Division at GSA, reported in December that all is well with the 1.2-million-ton natural rubber stockpile. Casto, in a year-end report to RUBBER WORLD, agreed he had "no problems at all" with the huge inventory, now that virtually all the low-grade holdings have been disposed of.

He said the stockpile was rocking gently along at a 3,000 tons per month rotation clip, one guaranteed to keep the stockpile fresh and, at the same time, interfere as little as possible with the free market. The last of Casto's problems disappeared about last June when the program to upgrade the inventory was completed. Until that time GSA was having difficulty persuading rubber manufacturers to accept the 4,500 tons each month designated for replacement by better quality rubber. However, the last—or most of it, at least—of this unwanted supply (purchased during the Korean War) was shipped out of GSA's warehouses by the end of June, and the agency has settled down to routine rotation of the estimated 3,000 tons per month moved out to keep the inventory in good condition.

Casto viewed the general rubber picture in the same "everything's rosy" light in which he saw the stockpile. Natural rubber is in good supply, he said, and stocks of synthetic rubber stand at reasonable levels. Until a year ago, he pointed out, synthetic inventories were too low to allow efficient and smooth meeting of demand. However, the GSA official summed up, 1957 was a year in which production capacity for synthetic rubber experienced a growth unprecedented in the history of U. S. industrial development, and ample supplies are now available.

The natural rubber market developed a looseness toward the end of 1957, Casto noted, "but nothing that can be described as a burdensome surplus exists."

The government's rubber holdings have hung heavily over the market at times over the past 10 years, but their influence since the Suez Canal crisis had declined to the point where some 13 months have passed since the last meeting of the Rubber Industry Advisory Committee. Moreover, Casto revealed, there is no plan to call the group together in the foreseeable future. The Committee last met during the Fall of 1956 to consider a rubber manufacturer's proposal to modify the rotation schedule, if necessary, to meet any emergency shortage stemming from the Suez blockade. The plan was shelved.

Barring a similar crisis, Casto indicated, the Advisory Committee will continue to enjoy its vacation.

"We use the services of the Industry Advisory Committee," he said, "to lessen a threatened impact on producers and consumers. Unless we do have a problem, we would not call the group together."

In such cases the advisory group is asked to work out the best plan for minimizing the problem.

The 1.2-million-ton stockpile, Casto said simply, "is no longer a major factor in the market." Until last June, he recalled, he spent a "considerable" share of his time "trying to interest rubber manufacturers to take a portion of our stockpile." This effort was in connection with both upgrading and rotation rubber.

"We are now in such shape," he explained, "that we do not have to go and ask people to buy rubber for our rotation program. Our monthly rotation has dropped from 7,500 tons to about 3,000 tons, most of this regular rotation to keep fresh rubber in the stockpile."

GSA Sets Up Little FFC

The General Services Administration disclosed in December that it has established a "little Federal Facilities Corp." within this huge services agency to handle the synthetic rubber and other disposal duties inherited last summer from the Treasury Department. Unsurprisingly, the new FFC chief is Harold W. Sheehan, general counsel for the defunct Rubber Producing Facilities Disposal Commission and rubber disposal expert with the FFC between the date of RPFDC's demise in September, 1956, and transfer of FFC's responsibilities from Treasury to GSA last August.

Duties of New Unit

FFC, as it existed on its own and later as an office in the Treasury Department, was dissolved as of August 1. Its principal function then and now has been administration of sale and

lease contracts worked out by RPFDC while it was doing business here. At the last counting, the government still held four mortgages from its rubber plant disposal program of recent years.

Sheehan, as chief of the GSA version of FFC, will have the responsibility for collection under these arrangements and for supervision of anything that might arise in connection with the 10-year national defense clauses in most of the sale contracts. He will handle, besides, the government's interest in the lease contract with Publicker Industries of Philadelphia covering the alcohol-butadiene plant at Louisville. The lease expires in April, and GSA will probably begin steps to put the plant on the block.

Other Executives Named

Other officers of the new corporation are: Edward C. Sweeney, general counsel for both FFC and GSA; Max Medley, controller general for both outfits; and James F. Lynn, secretary of FFC, who doubles as administrative assistant to GSA head, Franklin Floete. Within FFC II is an Office of Synthetic Rubber & Tin, headed by G. J. Irwin. What work cannot be handled by these officials will be farmed out to GSA employes.

BLS Tire Wage Survey Hearings in February

The Department of Labor failed to complete its wage survey of the rubber tire industry in December, but all signs pointed to an official compilation of data early this year as to what constitutes the "prevailing wage or wages" paid by the industry to its workers. Within a context of flat opposition from tire manufacturers, the inquiry was proceeding at an orderly pace and was expected to reach the public-hearing stage in the coming month or in March.

Management spokesmen said that, with one exception, they were generally satisfied with the Department's procedure, although they have maintained and continue to maintain that the wage study is being conducted under an obsolete law—the 20-year-old Walsh-Healey Act. Walsh-Healey was pushed through Congress in the late 30's under the New Deal program to boost the depressed level of wages. The tack in this case was to require government suppliers under contracts worth at least $10,000 to pay the "prevailing wage" in their particular industries. The Labor Department was given the responsibility for finding the prevailing wage and notifying government contractors what their contract workers must be paid.

This is the way things still stand, although there is mounting pressure from management to have the Walsh-Healey Act repealed. In the tire industry's case it would take a minor miracle to head off its wage probe before it is complete, although eventual repeal of Walsh-Healey would not be unwelcome by management.

As of the end of the year, the Bureau of Labor Statistics within the Labor Department had circulated a questionnaire to manufacturers covered by the investigation and had sent field investigators to interview at least a dozen. When the questionnaire-field survey has produced all the necessary data (wages paid during each firm's pay period nearest November 15), it will be whipped into multi-chart form (as to geographic area, etc.) and sent to interested labor and management parties at least 30 days before public hearing. The hearing record will then be certified to Labor Secretary James Mitchell for final decision.

FTC Tire Advertising Guide Due This Month or Next

The Federal Trade Commission hopes in January or February to put in final form the proposed tire advertising guide lines which the Commission is counting on to clean-up "confusion" among tire consumers. By Christmas, FTC officials reported, they had a file full of "very favorable" comments from interested parties in the industry—mostly dealers—and were anticipating a similar, if less outspoken, response from tire manufacturers. One Commission official gaged the response as "excellent and enthusiastic" and predicted that the guides would be finalized in their original or modified form early this year. He made no secret about the fact that FTC is in a hurry to get the guides operative.

Among the interested rubber associations, The Rubber Manufacturers Association, Inc., was not expected to file a commentary. An undetermined number of RMA members, however, were expected on their own to reply to the FTC invitation for suggested modifications. An RMA spokesman said there was no known serious objection to FTC's proposals through the first few weeks after the guides were issued in proposed form during November. Two extremely interested dealer groups—the National Tire Dealers & Retreaders Association and the National Federation of Independent Business—gave the suggested guides a hearty reception when they were issued and were expected to follow up with formal letters of approval to FTC.

The proposed guides cover 11 areas of advertising controversy in the tire industry—from standards of construction to advertised claims to price to guarantees. If an unexpected groundswell against the rules, as proposed, should develop, or if there are a significant number of pleas for substantial changes, the Commission would probably schedule a public hearing before finalizing the guides. The initial response indicated, however, that FTC would bypass a hearing and move directly to publish the guides at once.

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U. S. Rubber Purchase

United States Rubber Co., New York, N. Y., has purchased the Rogers Super Tread Tire Co., Yakima, Wash. Rogers, a pioneer in the retreading of giant off-the-road tires, was acquired mainly to tie in with the facilities of U. S. Rubber tire dealers across the country who are servicing the tire needs of the highway and heavy construction industry. In addition, The Roger facilities will be used as a training center for personnel of the rubber company and its tire dealers.

The Yakima operation is said to be one of the largest and most modern of its kind in the world and will continue its business of retreading giant tires and providing off-the-road tire service to construction contractors with the same organization that built the business so successfully under the leadership of L. C. Rogers.

Mr. Rogers, founder and former owner, is retiring from active business, but will remain as a consultant to the company, which will continue to operate under its own name.

New Goodrich Center

The B. F. Goodrich Co., Akron, O., will construct a modern new distribution center on a five-acre tract at Oakwood Blvd. and Edsel Ford Expressway, Allen Park, Mich. A two-story brick and steel building, it will bring the company's warehouses and offices in the Detroit area under one roof for the first time. This includes B. F. Goodrich Tire, Industrial Products, and Footwear & Flooring companies, now located in four buildings in Detroit.

The new building will contain 83,000 square feet of floor space. Of this, 70,300 square feet will be devoted to warehousing, and the remaining 12,700 square feet to offices.

There will be sufficient space to store 50,000 tires of all types, rubber industrial products, and footwear and flooring products, which will be shipped to all sales points in Michigan and a portion of northwestern Ohio. The company's auto and home supplies, including batteries, spark plugs, freezers, and bicycles, will also be warehoused in the building, which is scheduled to be completed in July, 1958.

INDUSTRY NEWS

RMA Sees 1957 Record Sales Volume Equaled in 1958; Other Comments

TABLE 1. UNITED STATES RUBBER CONSUMPTION
(Long Tons)

	1956	1957	1958
Synthetic rubber	874,394	934,000	—
Natural rubber	562,088	541,000	—
Total new rubber	1,436,482	1,475,000	1,525,000
Reclaimed rubber	270,547	295,000	—

Rubber products manufacturers may record their biggest dollar sales volume in history in 1957, even surpassing the $6.2 billion figure registered in 1956, according to Ross R. Ormsby, president of The Rubber Manufacturers Association, Inc., in his year-end statement. While many reports were still unavailable at the year's end, 1957 also looked like the second biggest year in terms of rubber consumption, with further gains predicted for 1958. Individual comments from other leading executives in the rubber industry supported in general the RMA position.

With regard to consumption, new rubber use in 1957 was estimated at 1,475,000 long tons, a figure that would be exceeded only by the record year 1955, when 1,529,699 tons were consumed. On the basis of the present rate of increase, United States rubber consumption in 1960 should reach 1,635,000 tons annually.

The ratio of synthetic to total new rubber use was 58.5% in 1955 and 60.9% in 1956. In October, 1957, the high month so far for that year, the synthetic use ratio climbed to 64.5%. Elsewhere in the free world synthetic rubber use has climbed to 23% of total new rubber usage, and a further increase was predicted for 1958. Foreign requirements for synthetic rubber will continue to be met from United States production in 1958. In 1957, U. S. exports of synthetic rubber were expected to set a new record somewhere between 190,000 and 200,000 tons.

Table 1 shows the actual consumption figures for the year 1956 and the RMA estimates for the years 1957 and 1958.

In the product field, Mr. Ormsby estimated that by the end of 1957, replacement-tire shipments would amount to 56.5 million units for a new record and up more than three million units from 1956 sales. Original-equipment tire shipments were expected to amount to 32.5 million units, up 1.6 million units from 1956 figures. A further improvement of from 3% to 5% over 1957 replacement-tire shipments is likely in 1958. Actual production of passenger-car and truck-bus tires for 1956 together with the RMA's estimate for 1957, follows: 1956, passenger, 85,509,791; truck-bus, 14,854,810; and 1957, passenger, 93,000,000; truck-bus, 13,500,000.

Some 40,000 items produced in the non-tire branch of the industry will account for more than 51% of the total sales for 1958. These include such items as belting, hose, molded and extruded goods, foam products, hard rubber goods, sundries, rubber and rubber-soled canvas footwear, tire repair materials, heels and soles, flooring, and coated fabrics.

Rubber flooring held its position in the field of resilient flooring materials during 1957, despite the leveling off in industrial and home construction. Solid vinyl flooring, also produced by the rubber flooring branch of the industry, showed important gains in 1957 and is expected to show further substantial gains in 1958.

Sales of waterproof rubber footwear last year were expected to show a slight gain over sales for 1956, but the volume continued to be far below what was considered normal before and just after World War II, owing to changes in living habits and methods of transportation and a succession of mild winters.

Rubber-soled fabric footwear continued to show growth, and shipments in 1957 should be higher than in 1956. The industry is apprehensive, however, over the threat to both volume and earnings posed by the influx of competitive footwear from low-cost foreign producers.

O'Neill See Good Year For Rubber in 1958

The rubber industry's 1958 prospects loom encouragingly in the nation's economic outlook for the New Year, William O'Neil, president of The General Tire & Rubber Co., said in his annual year-end survey which was released in mid-December.

With regard to the nation's overall business picture, O'Neil believes that enough of our other major industries, such as automotive, building, chemical, plastics, food, and steel, will make the same appreciable gains as the rubber industry to balance out the year equal to or slightly better than 1957.

"The end result will be satisfactory," he maintained.

The rubber industry's biggest 1958 gain will come from about a 5% greater demand for replacement tires, the General Tire president pointed out. This increased replacement demand plus original equipment requirements for new automobiles and trucks will require the rubber industry to produce an estimated 114 million tires of all types in 1958, he added.

Much of the nation's multi-billion-dollar road building program will move off the drawing boards into actual construction late in 1958 or early in 1959, providing a greater need of truck and giant off-the-road tires which the rubber industry is prepared to meet.

"So much of our nation's economy is tied into this highway program," O'Neil said, "that the sooner it is completed, the faster all business in the United States will realize the growth potential created by our expanding population. Congress must recognize the importance of roads in our national defense effort and, if need be, make it a 'crash' program to ensnarl any red tape now delaying progress."

The 1958 outlook for General Tire itself appears excellent, with the company's expansion into new fields, heightened by our own research and development of many new products improving its position immeasurably for the future, it was said.

Mr. O'Neil believes the rubber industry is facing the biggest growth era in its history.

Keener Expects Business To Equal 1957 in 1958

The American rubber industry may expect business in 1958 to equal or exceed 1957 totals, J. W. Keener, president of The B. F. Goodrich Co., said in his year-end statement.

He estimated that the United States will probably consume about 1,500,000 long tons of new rubber in 1958, compared with the 1955 high of 1,530,000 tons and 1957's estimated total of 1,480,000 tons. About 64.5% of the total new rubber consumed in this country will be synthetic rubber.

World consumption of rubber in 1958 will probably set a new record of 3,200,000 long tons, excluding the use of both natural and synthetic rubber in the Soviet bloc, about which little is known. Mr. Keener said synthetic rubber will account for about 42% of the total 1958 world consumption (excluding Soviet synthetic rubber), compared to 40% in 1957.

"Our nation's capacity for production of synthetic rubbers should increase to 1,700,000 tons by the end of 1958, as compared with 1,372,000 tons capacity at the beginning of 1957 and 1,220,000 tons in 1956," he added.

Excluding the Soviet bloc, the rest of the world is using 1,265,000 tons of synthetic rubber in 1957, or about 133,000 more tons than in 1956. It was estimated that consumption of natural rubber on a worldwide basis will decline about 17,000 tons in 1957, which is the first time since 1952 (when the Korean war natural-rubber consumption controls were in effect) that world natural rubber consumption has declined from the previous year's level.

Continuing high prices for natural rubber, in addition to the expansion of synthetic rubber producing capacities in the United States and western Europe, are responsible for the sharp increase in synthetic rubber consumption, Mr. Keener said in conclusion.

Another executive of the Goodrich company, J. A. Hoban, vice president of marketing, predicted in early December that an upturn in business in mid-1958 will be "so substantial that the growth trend in general business will be continued." A rise in consumer spending will be a major factor in sustaining general business activity at a very high level, he added.

Robins Expects Non-Tire Growth Rate to Gain

Thomas Robins, Jr., president of Hewitt-Robins, Inc., emphasized in his year-end statement that the non-tire segment of the rubber industry is expected to consume about 582,000 long tons of rubber in 1958, an amount equal to 38% of the country's total rubber consumption.

The dollar sales volume of non-tire rubber products already exceeds that of tires and should continue to grow at a faster rate as the result of the development of many new products and increased usage of such standard non-tire items as conveyor belting, foam rubber, industrial hose, floor coverings, and rubber footwear products, he added.

Hewitt-Robins expects continued steady growth in the use of belt conveyors for handling ores, coal, crushed stone, and other bulk materials. Indications are that conveyors will be used to a greater extent for long overland haulage where they can move materials more efficiently than trucks or rail cars.

This company also looks forward to steady growth in the use of foam rubber and urethane foam as a cushioning material in automobiles and furniture, as an interlining in clothing, and in miscellaneous newer applications that are now in the early stages of development.

NRB on Long-Term Natural Rubber Demand

H. C. Bugbee, president, Natural Rubber Bureau, emphasized in his year-end statement that "world demand for natural rubber continues at a saturation pace and promises to maintain this level for a number of years to come."

In 1957 the natural rubber industry produced approximately 1,930,000 tons of rubber for a world that consumed some 1,900,000 tons. About 550,000 tons of natural rubber, or about 37% of the overall total of 1,475,000 tons, was used in the United States.

If natural rubber prices in the months to come maintain a closer relation to those for synthetic rubber than in the two years just past, 1958 could see a rise in the percentage of natural used in the U. S., it was said. This situation would hold true particularly if, during 1958, the production of truck tires, the largest single segment user of natural, rose at a higher percentage rate than that of passenger tires.

Because of the saturation demand for natural rubber and the fact that high-yielding rubber plantations can produce rubber under the present price for SBR, the American rubber industry during the past couple of years has either entered into natural rubber production on its own or has increased holdings already under cultivation, the NRB president pointed out. All of the Big Four rubber companies have considerably upped natural rubber production activities.

In Malaya, particularly, natural rubber growers are actively taking advantage of the almost certain market for their product. The average yield per tapped acre on estates in Malaya today is 496 pounds per year. New replantings now going on will produce anywhere from 1,200 to 2,000 pounds per acre per year,[1] and, in addition, rubber scientists are working on methods to increase tree yield through injection of stimulants, it was explained. Also, in another move to increase natural production, efforts are being directed at making available to rubber growing, millions of acres of virgin Malayan jungle.

To make certain that advances developed abroad are rapidly transmitted to rubber product manufacturers in the United States a technical service is being planned that will make available to U. S. customers all natural rubber advances as they are developed.

[1] RUBBER WORLD, Dec., 1957, p. 409.

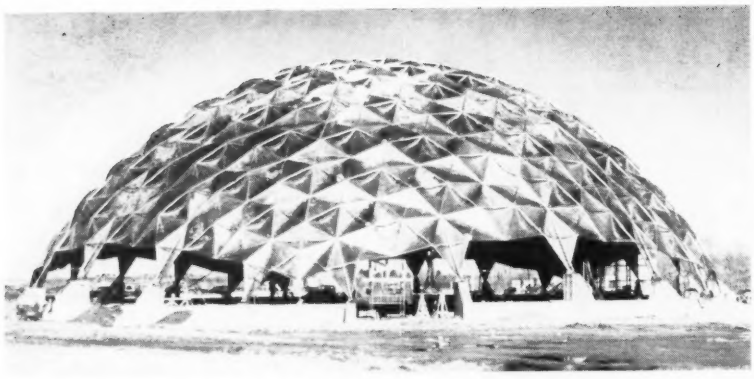
Hewitt-Robins To Build Ore Conveyor System

Hewitt-Robins, Inc., Stamford, Conn., has received an order amounting to more than $5,500,000 for the construction of a material handling system at a new iron ore mine atop a 2600-foot mountain at Barsua, Orissa Province, India, 225 miles southwest of Calcutta. The order, largest in the history of the company, calls for the design, fabrication, and erection of a two-mile conveyor system and related crushing, screening, and storage facilities that will take the ore as it comes from the mine, process it to specifications, then load it into railroad cars for shipment to the steel plant 45 miles away.

The machinery and conveyor belting and most of the vibrating screens will be manufactured by Hewitt-Robins plants in Buffalo, Passaic, and Chicago. Electric motors, crushers, bins, and some of the screens and certain other items of equipment will be furnished by Hewitt-Robins (Canada) Ltd., and all foundation and concrete work will be done by a sub-contractor, Simons-Carves, Ltd., Stockport, England. Structural steel will be made in India.

The new mine, owned by Hindustan Steel Private, Ltd., is located in a dense bamboo jungle inhabited by wild elephants. The deposit covers an area about 35 miles long and a mile wide containing an estimated 150,000,000 tons of ore. The iron content ranges from 54 to 65%, roughly comparable to the best ore mined on the famous Mesabi range in Minnesota.

Construction of the facilities is to be started immediately and completion is scheduled for December, 1959. The project will be headed by E. H. Fallon, contract engineer in the Hewitt-Robins New York engineering department. A Hewitt-Robins resident engineer, W. J. Matus, and his staff will be stationed at the mine site.



Nearly completed aluminum dome structure as recently erected with aid of rubberized fabric balloons

Aluminum Stressed-Skin Dome Building Erected by Rubber-Fabric Balloons

The first application of an aluminum stressed-skin dome as an industrial building and the first time a unique rubberized fabric balloon method was used to raise the aluminum dome occurred recently in Abilene, Kan. (See cover illustration and accompanying photograph.) The dome structure, developed by Kaiser Aluminum & Chemical Corp., was erected by Fi Fo Conveyor Co., a division of Vacu-Blast Co., Belmont, Calif., with the help of two balloons constructed of "Fairprene"[1] coated fabric made by E. I. du Pont de Nemours & Co., Inc. The nylon fabric was coated on the outside with "Hypalon"[2] synthetic rubber and on the inside with neoprene.

Aluminum Dome Details

In the construction of this aluminum dome-type building (there are only two other such structures in the world), aluminum panels which compose the dome's shell were bolted together around a mast, and as the diameter and the height of the shell increased, the panels were raised by the two balloons. The completed dome was 145 feet in diameter and 49½ feet high.

The dome's unusual design eliminates the need of pillars or other interior supports in the finished structure and thus provides unrestricted floor space and clear sight lines in any direction within the interior and permits many different uses of the structure. Among these applications, which are in the planning stage, are a bank building, a supermarket, TV studio, school, and dome-covered gas stations. Fi Fo Conveyor Co. will use the Abilene structure as a factory and office building for the manufacture of their pneumatic granular conveying systems. Fi Fo has completed designs for a grain storage dome, equipped with Fi Fo granular conveying equipment, which the company plans to market in the grain-rich Plains States area.

Of particular interest in connection with the future application of this new type-structure is the fact that the December 21 issue of *Business Week* states that a new company has been formed to manufacture aluminum-domed theaters by ex-NBC president Sylvester L. Weaver, Jr., Kaiser-Aluminum's Henry J. Kaiser, theatrical producer Mike Todd, and architect Frank Lloyd Wright. A prototype of this theater is being built in a "secret" location.

The aluminum dome structure has the advantages over conventionally designed buildings in that its cost of erection is only about $5.50 per square foot; erection time is only about 600 man-hours; it will withstand loads of more than 100 pounds per square foot, and it provides the maximum of usable space since there are no interior columns.

Balloon Erection Method

In erecting the aluminum dome, two balloons, one on top of the other, were placed underneath several aluminum panels which formed the dome's crown. Inflation of the balloons was controlled to raise the dome shell as additional panels were added.

The smaller of the two balloons, which was 50 feet in diameter and stood 24 feet high when fully inflated, rested in the center and on top of the other. The larger balloon was 95 feet in diameter and stood 34 feet high when fully inflated. When this second balloon was being inflated, the diameter remained constant and all of its expansion was vertical. Chain tiedowns held the two balloons in place, and air pressure was supplied from a blower. When the two balloons were fully inflated, they stood 54 feet, or about five stories high.

The dome was erected over a concrete area which will be the floor of the building.

Balloon Details

The "Fairprene" nylon coated fabric, 4,200 yards of it, was prepared at Du Pont's Fairfield, Conn., plant and shipped in rolls 54 inches wide to Gordon Holcombe, Industrial Covers, Inc., San Francisco, Calif., where the balloons were fabricated.

In designing the balloons, a surface was needed that would be tough, offer abrasion resistance, and consist of a material that would adjust readily to the shape of the dome as it shifted during erection. "Hypalon" was considered to be the only synthetic rubber material that would offer such characteristics. The good low-temperature flexibility of this synthetic rubber was also an important factor in its use in Kansas in November.

The "Hypalon" coated fabric is easy to fabricate; it can be sewn and cemented and can be patched simply in case of a tear. It has dry finish and is not tacky.

The balloons can be inflated and deflated by unskilled laborers. In addition, the deflated balloons can be folded away and shipped without the minute care that less tough material would require. Also, workers can walk across the deflated bags without worrying too much about puncturing the surface.

The erection of the aluminum dome-type building structure by means of the coated fabric balloons permits a continuous operation since it eliminates the delay involved in hoisting the partially assembled dome before additional aluminum panels can be added, as would be the case with other erection methods.

[1]Du Pont trade mark.
[2]Du Pont trade mark for chlorosulfonated polyethylene.

Acrylic Acid Plant

The first facility in this country for making glacial acrylic acid in large commercial quantities is nearing completion at the B. F. Goodrich Chemical Co. plant, Calvert City, Ky. This new unit, expected to be on stream in early 1958, will have an annual capacity of several million pounds of glacial acrylic acid. Availability of this product on this scale will offer important handling advantages to manufacturers now using water solutions of acrylic acid.

The new plant will be integrated for the production of acrylic resins besides the acid. Related chemicals to be produced include Good-rite TS-20, a processing size for nylon; Good-rite CB-35, a foundry core binder; and additives for pharmaceutical, cosmetic, and latex paint formulations.

Record Attendance at Chemical Show in New York

Forecasts of a nation-wide industrial speed-up were disclosed at the twenty-sixth Exposition of Chemical Industries in New York, N. Y., December 2 to 6. Chemical achievements are leading current industrial progress, and the Exposition revealed many improved processes activated by equipment of new design, much of it made available by new structural materials. These promise impressive gains in production rate and far more favorable costs for manufacturers of every description.

The Exposition was the largest in the 42-year history of the institution and also the heaviest so far held in the New York Coliseum. Material for the more than 600 exhibits occupied all four floors of the great arena, with an area of 300,000 square feet, and weighed close to 1,400 tons, or a million pounds more than the heaviest previous load in the building. There were an estimated total of 35,000 visitors, with approximately 400 chemists and engineers present who came from abroad.

Plastic Materials and Products

Noteworthy of many of the exhibits was the alinement of plastics with metals and the great use of synthetic materials in structural design. Examples of applications of products made from Teflon, the Du Pont tetrafluoroethylene plastic resin, include a new pipe coating product called Chemipipe, manufactured by Ethylene Chemical Corp. General Plastic Corp. featured a wide line of Teflon-based coatings; while Pennsylvania Fluorocarbon Co., Inc., displayed a wide range of sizes of flexible tubing made from Teflon. John L. Dore Co. displayed Teflon-coated pipes and fittings; Haveg Corp. exhibited various products including plastic corrosion and electrical resistant equipment, its epoxy glass, its Nonaromat resins, and its Furan cement.

Rheinhold Engineering & Plastics Co. showed its special reinforced plastics which have applications in the aircraft, missile, and electronic fields; Palo Laboratory Supplies presented polyethylene, polyurethane, polyvinyl, and nylon laboratory products; Heil Process Equipment Corp. featured Rigidon and Rigivin fabrications for highly corrosive conditions.

Companies which displayed products fabricated from PVC included Alpha Plastics, Inc., (pipe, fittings, and valves); Easton Plastic Products Co., Inc., (pipe, tubing, and flanges); Industrial Plastic Fabricators, Inc., (tanks, tank liners, troughs, pipe, valves, bolts, nuts, etc.); The Luzerne Rubber Co., (pipes, fittings, and valves); and Bel-Art Products, (sheeting, protective covers, etc.).

Other companies manufacturing plastic or plastic-containing products and materials were Barrett Division, Allied Chemical & Dye Corp., (Plaskon-nylon molding compound); Minnesota Mining & Mfg. Co., (Kel-F, halo-fluorocarbon polymers); Du Verre, Inc., (resin bonded fiber-glass fans); The Garlock Packing Co., (fluorocarbon products for valves, pumps, hydraulic and pneumatic service, and O-rings); United States Gasket Co., (Kel-F laminates for abrasion-corrosion resistant linings); American Vulcathane, Division of The Nalge Co., (polyethylene waste and drainage systems); John Crane Packing Co., (Chemlon and Teflon gaskets and O-rings); Resistoflex Corp., (Fluoroflex and Compar pipe, fittings, bellows, and materials); Raybestos-Manhattan, Inc., (Teflon packings, sheets, and tubes); Metalweld, Inc., (cementable Teflon for lining bulk material-handling systems); and The Duriron Co., Inc., (modified epoxy resins for lining chemicals-handling equipment).

Of special interest was Montecatini's exhibit, where a host of actual household and industrial products made from the company's Moplen polypropylenes were on display for the first time in the United States. Moplen polypropylenes are the first practical result of Giulio Natta's work on stereospecific polymerization of olefins, using highly specialized catalysts which custom tailor the molecular structure to fit the end-product. The isotactic polypropylenes exhibit excellent resistance to acids, alkalies, and various solvents; they can be easily cleaned and sterilized and are economically produced in any desired color, with a high finish and excellent detail.

Another new development on exhibit was the manufacture of urethane plastics (polyurethanes) as foams, adhesives, and coatings. The foams can be used for positioning parts within a container—as in packaging; they may be soft or hard.

Many companies which manufacture rubber products or chemicals for the rubber industry were present. Some representative products and their manufacturers were ARco rubber protective linings, Automotive Rubber Co., Inc.; silicone sponge rubber products and Chevron packings, Garlock Packing; rubber springs and O-rings, The Parker Appliance Co.; linings for industrial equipment, Industrial Filter & Pump Mfg. Co.; and hard rubber pipe and fittings, Luzerne Rubber.

Rubber Products and Chemicals

Some of the companies at the Exposition which produce chemicals for the rubber industry were National Rosin Oil Products, Inc., (Galex stabilized, non-oxidizing rosin); Victor Chemical Works, (plasticizers and sequestrants); Chemo Puro Mfg. Co., (caprylates, acetates, formates, antioxidants); West Virginia Pulp & Paper Co., (Indulin-reinforcer); and Allied Chemical & Dye Corp., (urethane compositions and intermediates).

Machinery and Equipment

Numerous manufacturers who produce equipment for the rubber and plastic industries were on exhibit, including Industrial Products Engineering Co., (materials handling equipment); Heil Process Equipment Corp., (fume scrubbers, tanks, linings); Electroweld Mfg. Corp., (autoclaves, tanks, custom machinery); Richardson Scale Co., (automatic weighing and proportioning equipment); H. W. North Co., (drives and flexible couplings, autoclaves, mills); Automotive Rubber Co., (rubber lined drums, acid buggy, gas scrubber systems); Charles Ross & Son Co., Inc., (mixers, kneaders); Wallace & Tiernan, Inc., (scale feeders and meters); General American Transportation Corp., (Airslide rail cars); and Raybestos-Manhattan, Inc., (acidproof rubber tank linings).

Other rubber applications or equip-

Montecatini's exhibit of products made from polypropylenes

ment included rubber pellet cooler, C. G. Sargent's Sons Corp.; continuous mixers, Baker Perkins Inc.; Turba-Film processor, Rodney Hunt Machine Co.; Hydropulse pumps and homogenizers, Scott & Williams, Inc.; centrifuges, contactors, extractors, Podbielniak, Inc.; rubber lining applications, Bishopric Products Co.; analytical measurements probe unit, pH meter, Analytical Measurements, Inc.; heating or cooling pipe, F. R. Gross Co., Inc.; heating or cooling units, Dean Thermo-Panel Division, Dean Products, Inc.; release coated material, Bemis Co.; roll mill, blenders, mixers, J. H. Day Co.; grinding and mixing equipment, U. S. Stoneware Co.; continuous operation mixer, curing agent, Lancaster Chemical Corp.; and disperser-homogenizer, Tri-Homo Corp.

An interesting off-shoot of polymer chemistry demonstrated was the use of Thiokol Chemical Corp.'s liquid polymers in rocket propellent engines. The show also displayed the latest rocket engines employed in space exploration and national defense.

Associated with the Exposition was an advisory committee composed of men who are eminent in chemistry and the chemical industry. E. R. Weidlein, who is trustee of the Mellon Institute, was this year's committee chairman.

Admission was by invitation only, and the general public was not admitted.

Firestone Reveals New Tires at Test Track Opening

Firestone Tire & Rubber Co., Akron, O., unveiled its new tire test track in Fort Stockton, Tex., in early December and in the process provided newsmen a preview of three new tire developments. The first was Firestone's "Supreme Safety Airlock" tire; the second was its "Steelcord" tire; and the third was its new approach to the elimination of the spare tire in the form of the "Perma Spare."

The spare-tire elimination by Firestone, although still in the experimental stage, is being given "serious consideration" by the automotive industry, it was said. "Perma Spare" is a narrow steel disk with a hard rubber tread which fits directly on to the wheel without removing the deflated casing. Simply by jacking up the car, removing the lugs, and attaching this spare to the outside of the flat tire, the motorist in minutes can be moving again.

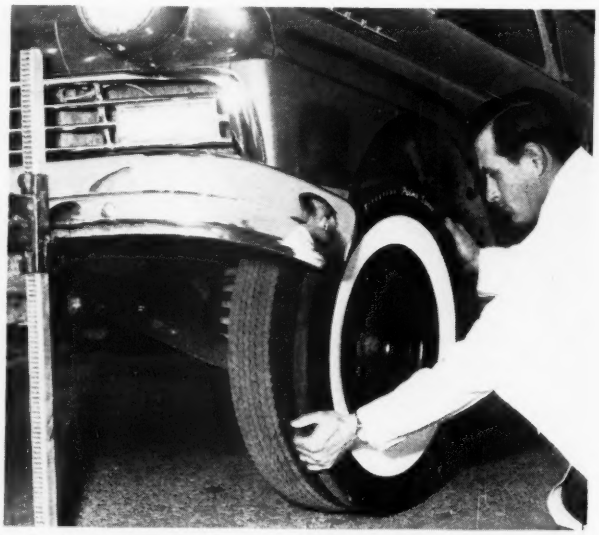
Firestone officials said the tire would operate at speeds up to 45 miles per hour and could be driven 60-75 miles per hour for a time without danger. Under normal circumstances, the spare would last for an indefinite period.

The "Supreme Safety Airlock" is a double-chambered tire similar to Goodyear's "Captive-Air." The Firestone tire differs in two respects: (1) it has a trough or "hump" in the inner nylon chamber which, the company says, will keep the built-in spare from being punctured by long nails penetrating the outer casing; and (2) the inner chamber is held in position against the rubber flanges by air pressure rather than by flaps between bead and rim.

The "Airlock" has dual inflation points, and the pressure in the inner chamber will allow the driver to proceed to the nearest tire repair point if the outer chamber is punctured. Firestone has not moved into large-scale production with this tire, however, and says at this point that the automobile companies are still testing the tire. At the replacement level, the dual-chambered tire may be ready for national distribution in six to eight months. Meanwhile, limited marketing will go on in certain regions.

Making its bid for the wire tire market, Firestone announced its "Steelcord" truck tire for regular highway use. The company has made special high-load-capacity wire tires previously. President Raymond C. Firestone said that truckers will realize 20% more mileage on original tread and extra thousands of retread miles with this new tire. The new two-ply wire cord tire is said to be twice as strong as 12 plies of rayon or nylon.

The Firestone test track, a 7.712-mile oval, is considerably faster than the Indianapolis Speedway and is banked on turns to take speeds of 130 miles per hour. The track is so designed that tires are tested under conditions similar to every-day highway driving as well as at unusually high speeds.



Firestone "Perma Spare" being mounted with regular tire

Cross-section of Firestone's dual-chambered "Airlock" tire

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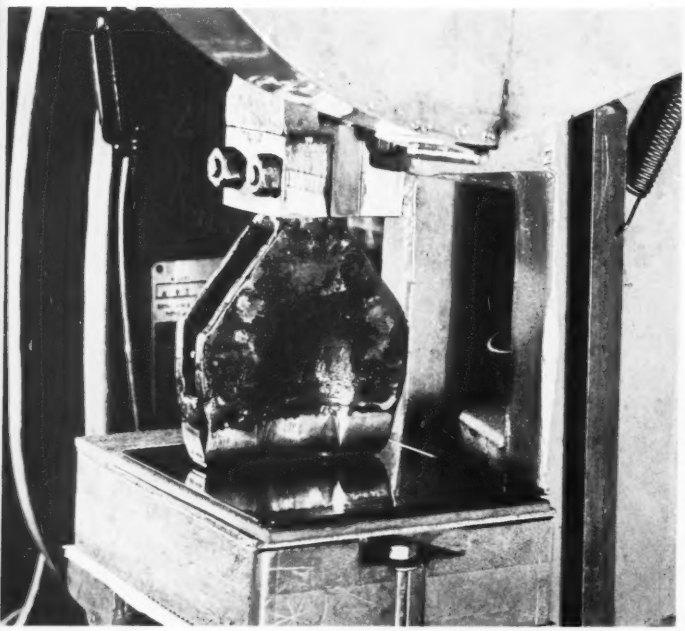

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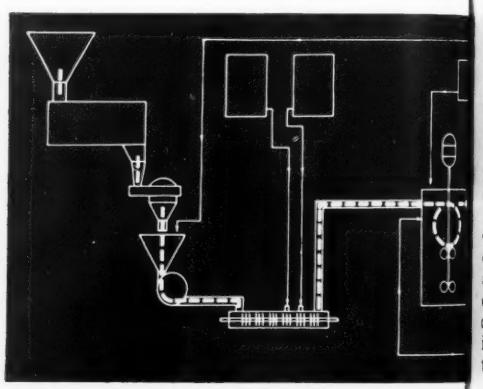
In a laboratory that has made many important contributions to the industry... Columbian specialists work endlessly with rubber formulations... test and retest until results meet the most exacting specifications!



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Columbian is always studying ways to cut your costs, improve your profits. A recent Columbian study has developed new ways to load and stack bags in railroad cars and trucks... provide easier, more efficient handling... save time and work.

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MICRONEX W-6 EPC Easy Processing Channel
STATEX-B FF Fine Furnace
STATEX-M FEF Fast Extruding Furnace
STATEX-93 HMF High Modulus Furnace
STATEX-G GPF General Purpose Furnace
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Enlarged Goodyear SBR latex plant

SBR Latex Plant Enlarged

Completion of new production facilities at a cost of approximately 2¾ million dollars, which will boost rated capacity of The Goodyear Tire & Rubber Co.'s SBR latex plant in Akron, O., to 27,500 tons annually has been announced. With this 50% increase in capacity, this Akron plant becomes the world's largest SBR plant devoted exclusively to the production of high solids latex.

One of the main features of the plant expansion is the addition of 10 reactors, each with a capacity of 3,750 gallons. In addition, a new recovery area consisting of two butadiene and two styrene recovery columns was constructed to handle the increased production. Latex storage facilities have also been increased 200%.

Originally engaged in the production of dry-type SBR, the plant was converted to latex production in 1952. Just recently, the plant pioneered and successfully developed a system for continuous polymerization of high solids latex, the only SBR plant thus far able to do so, it was said.

Sale of SBR latices produced by this plant are marketed under the name of Pliolite by the Goodyear chemical division.

Bolta Gets New Calender

An elaborate new calender, custom-built and capable of operating at far higher temperatures than any calender heretofore available, is now in operation at The General Tire & Rubber Co.'s Bolta Products division, Lawrence, Mass.

Precision-built and completely automatic, the new calender is capable of producing 12,000 yards of vinyl sheeting per hour, with a potential of as many as 288,000 yards per day. The total output could double these figures by virtue of the fact that Bolta now has two separate calenders in round-the-clock operation, instead of just one.

A major feature of the new calender is its exceptional temperature range which can be raised at least 200° hotter than any other calender now in existence. The higher temperature range permits the handling of resins and other materials that could not be calendered previously.

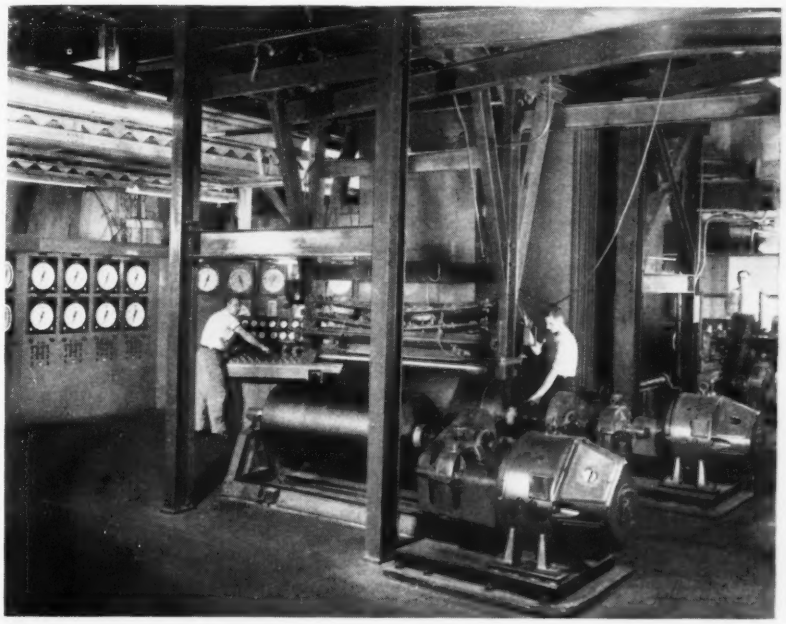
Built especially for Bolta by Farrel-Birmingham Co., Inc., the calender was designed by Bolta engineers under the direction of James Casey, chief engineer. It weighs over 200,000 pounds and is mounted on 1,250 tons of concrete.

MRG Officials Elected

George E. Carlson has been elected chairman of the board of directors, and Robert W. Carlson, who has been vice president and general manager, will succeed him as president of Minnesota Rubber & Gasket Co., Minneapolis, Minn. Responsibilities will also include direction of the company's affiliated divisions. These include Minnesota Silicone Rubber Co., Minnesota Rainbow Rubber Co., Minnesota Latex Rubber Co., A-P-D Co., a research and development organization, and Master Tool, Inc., production tool and die division.

The senior Carlson, who was a founder of Minnesota Rubber & Gasket, which started business in 1946, organized and directed the firm's nation-wide sales organization and was instrumental in its successful pioneering of the injection molding process for rubber seals and precision molded rubber parts. As board chairman, he will intensify his activities in the fields of administration, sales, advertising, and new and special projects.

Robert Carlson came to Minnesota Rubber in 1948 as a chemist, following 2½ years in the Air Force. He has since held positions as plant manager and general manager and, in 1950, was elected vice president.



FIRESTONE TIRE & RUBBER CO. INSTALLS WHAT IS REPORTED TO BE world's largest nylon heat-treating unit. Electronically controlled, and more than 90 feet high, it impregnates nylon tire cord with a chemical solution, then stretches and tempers it in a bank of ovens.

Goodyear Builds Big Popeye

Goodyear's Popeye for Macy's

In August, Victor A. Herbert, special products representative, aviation products division, The Goodyear Tire & Rubber Co., made plans with Macy's artists to build to scale a 56-foot high Popeye which was used in the company's Thanksgiving Day parade in New York on November 28. Goodyear draftsmen designed 253 patterns to form the huge figure, figured the shape of 10 valves for inflation, and carefully placed holding patches and lines so that Popeye would fly impressively during the parade.

Assemblers, in putting the balloon together, used more than 33 gallons of paint, in four colors, and more than 600 linear yards of fabric. It took approximately 75 days to build the colorful figure balloon.

A single ply of rubberized neoprene-coated nylon fabric, the type used in airships, accounted for the balloon weight of a little more than 250 pounds, deflated. The balloon was 56 feet high and 32 feet wide. Popeye's feet were 10 feet in length; he was 16 feet across in the shoulders and had a 21-foot reach, a 14-foot hand, and a pinky nose three feet wide. To outfit him, he would need a hat in size 9 (feet, that is). More than 6,000 cubic feet of helium was required to inflate Popeye, when he weighs 110 pounds, free lift.

Also scheduled to fly during the colorful parade were a 70-foot Spaceman, Gorgeous Gobbler, Soldier, and Observer balloon, all established favorites from previous seasons.

During 30 years of figure balloon making, Goodyear has designed some 40 whimsical characters for Macy's. Average life span of the balloons is five years.

Neoprene's Silver Jubilee

Neoprene, a general-purpose synthetic rubber, was first announced in November, 1931, and was first produced commercially in 1932 by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Initially introduced at $1.05 per pound during the bottom of the depression, neoprene sold for 39¢ a pound, in 1957, its twenty-fifth anniversary year of commercial production.

In 1925, a young Du Pont chemist, Elmer K. Bolton, heard a paper presented by Father Julius A. Nieuwland, University of Notre Dame, on his research on acetylene gas. This led to an investigation by Dr. Bolton and other Du Pont chemists, resulting in a previously unknown compound, named chloroprene, when monovinylacetylene is treated with hydrochloric acid. It was found that chloroprene could be converted into a rubber-like solid which was generically called neoprene.

Production of neoprene each year from 1932 to 1940 doubled that of the previous year except in the recession year of 1938 when a somewhat smaller increase was made.

Neoprene has been used to make more types of rubber products than any other synthetic. For more than 20 years, neoprene compounds have protected cables exposed to the baking rays of the sun or laid in salt marshes. The compounds also cover air hoses and electric cables that are used in quarries, mines, and on construction jobs. These compounds, moreover, do a great variety of jobs in the oil industry, and the versatile rubber is used for linings in chemical tanks and pipelines.

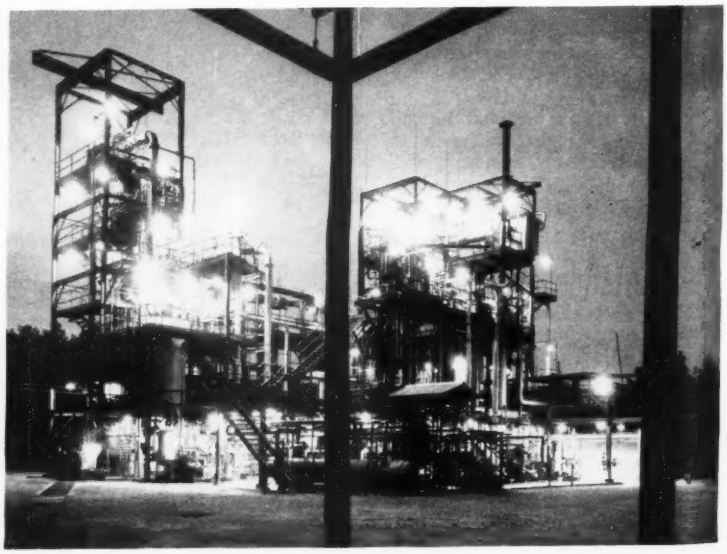
In the twenty-fifth anniversary year of neoprene, Du Pont placed on stream two new synthetic rubber plants and started construction of a third in the United Kingdom. A new 50-million-pound neoprene plant is in operation near Montague, Mich.; and a plant for the production of Hypalon (chlorosulfonated polyethylene) in Beaumont, Tex., has a 15-million-pound capacity.

Army to Buy Overshoes

The Military Clothing & Textile Supply Agency plans to procure in the near future approximately 63,360 pairs of overshoes, rubber, man's, high, black, five-buckle. Deliveries will be scheduled from May-July, 1958.

This advance information is furnished to assist industry in its planning for participation in this procurement. Specifications and all pertinent applicable conditions will be contained in the forthcoming invitation, it was said.

Invitations for bid will be mailed to those firms currently on the bidders' list. Other interested suppliers should write the Military Clothing & Textile Supply Agency, Philadelphia Quartermaster Depot, U. S. Army, 2800 S. 20th St., Philadelphia, Pa., attention: Purchasing Division, Footwear Branch.



Neoprene plant at Montague, Mich.

Committee D-11 Assigns Three SBR Numbers

Committee D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials through Subcommittee 13 on Synthetic Elastomers of D-11 has assigned numbers to three styrene-butadiene latices (SBR), SBR 2076 and SBR 2108, requested by Goodyear Tire & Rubber Co., and SBR 2107, requested by Shell Chemical Co. These will be submitted at a later date to letter ballot in ASTM Committee D-11 for acceptance by the Society and as addition to ASTM Tentative Recommended Practice D-1420.

TABLE 1. DESCRIPTION OF TYPES OF STYRENE-BUTADIENE (SBR) LATICES—ASSIGNMENT OF NEW CODE NUMBERS—ASTM D 1420-56T

Number as assigned	2107	2108	2076
Date assigned	9/27/57	9/27/57	10/27/57
Requested by	Shell Chemical Corp.	Goodyear Tire & Rubber Co.	Goodyear Tire & Rubber Co.
Distinctive feature	44% bound styrene	non-discoloring carbamate shortstop	non-discoloring shortstop
Close previous number, if any	GR-S X767	GR-S X765	—
Type	2107	2108	2076
Nominal temp., °F.	50	43	122
Activator	FRA	FRA	—
Shortstop	ND	ND	ND
Catalyst	OHP	OHP	P
Emulsifier	mixed	FA	FA
Nominal conversion, %	60	60	72
Nominal Mooney viscosity, ML-1+4(212°F)—polymer	140	—	50
Nominal residual volatile, unsaturate, %	0.1	0.1	0.1
Nominal pH value	10	11	9.0
Nominal surface tension, dynes per cm.	—	—	68
Nominal coagulum on No. 80 screen, %	0.3	0.10	—
Nominal bound styrene, %	44	23.5	23.5
Nominal total solids, %	61	40	27

More Dow Polyglycols

The Dow Chemical Co., Midland Mich., has started tank-car-quantity production of seven new resin-grade polyglycols tailored for urethane use. The polyglycols include one diol and six triols—all based on glycerine, with propylene oxide as a building block.

The diol, P-2000 (resin grade), is for use in flexible foams and elastomers. The number 2000 is the product's molecular weight.

The triols are resin-grade members of Dow's new family of polyglycols—the "11" series. They include the following: 11-80 for rigid and semi-rigid foams and urethane coatings; 11-100 for semi-rigid foams; 11-200, 11-300, and 11-400 for flexible foams. In this group the number 11 identifies the series, and the second number denotes the viscosity in centistokes at 100° F.

The seventh new polyglycol, also a triol, is designated 112-3 and is intended for flexible foams where essentially all primary terminal hydroxyls are desired. Tank-car prices for these polyglycols range from 25 to 35½¢ per pound.

In addition to these products Dow has polybutylene, polystyrene, and polyepichlorohydrin glycols available in developmental quantities.

Rayon versus Nylon Tire Cord

J. J. Harrison, Courtaulds Canada, Ltd., Montreal, P.Q., spoke on "Five Ways Best by Test" at a symposium sponsored by the American Rayon Institute at the Portage Country Club, Akron, O., November 21. The main points which he emphasized in his talks are summarized in the following paragraphs.

It was found in tests conducted to determine the comparative tread life of rayon *versus* nylon cord tires that the rate of tread wear on the nylon tires was such that the tires were considered unserviceable at 24,750 miles; before the same amount of tread wear was evident on the rayon cord tires, a total mileage of 31,275 had been achieved. In other words, a differential of 26% in tread life in favor of the rayon tires was revealed. The reason for this increase in tread life is attributed to the fact that nylon carcasses have a tendency to grow, and that tread rubber thus placed under stress deteriorates much more quickly than rubber in a relaxed condition.

A second exhibit is based on a report by leading sound engineers, using the most modern hi-fidelity audio techniques to measure the comparative octave levels of rayon and nylon cord tires under normal operating conditions, and this report has shown that rayon tires are up to 33% quieter than nylon when operating at equal speeds.

In another test the two types of tires were inflated to 24 pounds and allowed to stand for eight hours on an 8% down grade. The car equipped with rayon cord tires required only a 95-pound pull to move it from a standing position, and once started it continued to roll. The car equipped with nylon cord tires required a pull of 120 pounds, and when released, it rolled back to its original position on the flat spot.

Still another test showed that rayon tire cord retains a greater percentage of its original strength than any other textile cord material at high temperatures, as indicated by the following figures.

°C.	20	50	100	150
Rayon, %	100	93	82	71
Cotton, %	100	88	76	65
Nylon, %	100	85	71	59

In retreadability evaluations, it was found that the rayon test tires after three retreads had yielded 47,260 miles *versus* 36,993 for the nylon tires. Thus it may be said that three retreads on a rayon carcass have yielded as much mileage as four nylon retreads.

In recent impact tests both types of tires were found capable of withstanding the severe conditions without damage to the cords.[1]

[1] See RUBBER WORLD, Nov., 1957, p. 279.

New Polypropylene Plant

Hercules Powder Co., Wilmington, Del., has announced that the world's largest commercial plant to produce polypropylene is now on stream near Parlin, N. J. The first in North America, the new commercial polypropylene plant will have an annual capacity of 20 million pounds. The introductory price for the material will be 65¢ a pound.

Hercules polypropylene, known as Pro-fax, is made from a petroleum by-product, propylene gas. The much higher tensile strength, hardness, temperature resistance, stiffness, resilience, and clarity of Pro-fax, coupled with the inertness and water-resistance characteristic of a hydrocarbon polymer, indicate that it can give improved performance in a wide variety of applications, according to Hercules.

Additional characteristics of Pro-fax are excellent resistance to grease and oil, water, and many common acids, outstanding electrical properties, and high impact strength. This new plastic material will have many home, hospital, automotive, and laboratory applications. It has proved to have excellent molding characteristics and can be shaped and fabricated by any of the procedures common to the plastics industry.

When evaluated in existing molds, it yielded excellent parts without die changes or alterations in processing equipment, it is claimed.

Goodyear Retread Plant

A new retread and repair plant, built by Goodyear Tire & Rubber Co. at Sacramento, Calif., to be devoted exclusively for the repair and retreading of giant off-the-road tires, is scheduled to open April 1. The new plant, built at a cost of approximately one half million dollars, will become an important link in the company's rapidly expanding retread and repair field facilities to meet the growing needs of contractors working on highway, mining, and logging projects and construction programs such as airports and dams.

Considered to be one of the most modern and completely equipped retread plants of its kind in the country, it has facilities to retread off-the-road tires ranging in size from 11.00x24 to giant 29.5x29. The plant will also house 10 curing bands for top-capping the big off-the-road tires.

The modernistic one-story building, made of reinforced concrete walls, is 246 feet long and 122 feet wide and embraces a floor area of more than 30,000 square feet. In addition to the modern shop area the building will house general offices, plant manager's office, cement room, buffing facilities, drying unit, boiler room, and shower and locker facilities.

Barco Golden Jubilee

Barco Mfg. Co., Barrington, Ill., in 1958 celebrates the fiftieth anniversary of its founding. This 50 years represents growth from a small four-man second-story factory in Chicago, making a few brass products, to a 103,000-square-foot modern factory in Barrington, with a wide range of products of the company's own invention and design, serving practically all industry, railroads, the oil companies, commercial and military aviation, and, recently, a subsantial activity in the missile field.

Specifically, Barco manufactures flexible ball joints for the conveying of steam, air, oil, and other liquids and gases wherever a flexible connection or movement is required under pressure, vacuum, or temperature. These joints are made for temperatures from -300 to 2500° F., and even higher temperatures are under consideration. In size, the joints range from small ⅛-inch size used in industry and aviation to big 12-inch joints in a wide variety of styles. Special joints have been adapted to the requirements of rocket launching mechanisms and missile service.

Barco joints are also furnished for printing presses, for the rubber, plastic, die molding, and plywood fields, for rolling mills, and for rotary drums and dryers on paper machinery and in textiles and printing. Barco flexible hydraulic line assemblies were used on the landing gear on B-29 bombers. Barco swivel joints are used on molding presses producing countless millions of tires.

Barco's special stainless-steel ball joint, developed and patented by the firm, is the key to handling high-pressure LOX (liquid oxygen) and other missile fuels today. Barco joints serve also on nuclear-powered submarines.

A large number of the company's employes have been in its service for many years. Some of the oldest in point of service, aside from F. N. Bard, president and founder of the firm, have upward to 43 years to their credit. The employe organization includes more than 100 who have been in the service of the company for more than five years.

F. N. Bard

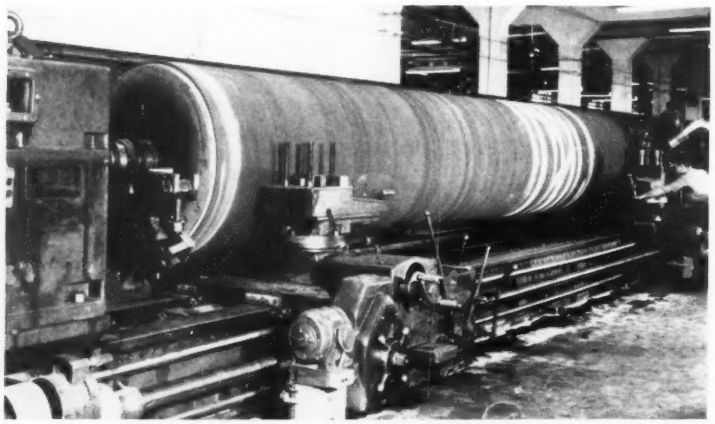
Makes Polyethylene Yarn

United States Rubber Co., New York, N. Y., has entered the polyethylene yarn business as a producer and seller. This is the first time the company, which has been in the textile business since 1917, has become a producer of plastic yarns.

The new yarn is being produced at Providence, R. I., in a plant of the company's footwear and general products division. The textile division will be responsible for sales. Sales headquarters will be at 1230 Avenue of the Americas, New York.

The company said it decided to enter the polyethylene yarn business because its market research studies had convinced it that this business has tremendous growth potential, and that there is room for another manufacturer of top-quality polyethylene yarns. The company said that with its large research and development facilities and staff of research and development scientists, it felt that it is in an excellent position to make a substantial contribution in this important, growing business.

The combination of low cost, high tensile strength, excellent chemical resistance, good heat resistance, and resistance to rot and water absorption has made polyethylene yarn attractive to manufacturers of automobile seat covers, outdoor furniture, industrial filters, venetian-blind tapes and cords, braids, shoe fabrics, tow targets, insulation, and marine fabrics.



RAYBESTOS-MANHATTAN, INC., PASSAIC, N. J., MAKES WHAT IT calls the world's largest rubber covered roll, just under 30 feet long and 50 inches in diameter for making newsprint 28½ feet wide trimmed. This is a suction press roll for extracting water by suction and pressure out of the wet paper being formed from pulp.

NEWS BRIEFS

Akron Chemical To Handle Durez Resins

Akron Chemical Co., Akron, O., is now handling the sales and services of Hooker Electrochemical Co.'s Durez Plastics Division's phenolic resins for the rubber industry in Ohio, Indiana, Michigan, western Pennsylvania, and western New York. Akron Chemical maintains a technical service laboratory and warehouse facilities at Akron, and its representatives are familiar with the rubber industry and its technical needs.

Problems in that industry will also continue to receive the attention of Durez technical service and research laboratories. The Durez division operates a $1-million technical service laboratory at North Tonawanda, N. Y., as well as an extensive basic plastics research laboratory at LeRoy, N. Y.

Having represented Hooker in the sale of chemicals to the rubber industry for many years, Akron Chemical is familiar with Hooker policies, personnel, and products.

Durez also manufactures fire-resistant polyester resins trade named Hetron, as well as polyester, phenolic, and diallyl phthalate molding compounds, all of which will continue to be sold and serviced directly by the Durez organization.

General Tire & Rubber, Canada, Changes Name

In keeping with its products and service expansion, The General Tire & Rubber Co., of Canada, Ltd., with headquarters in Welland, Ont., has officially changed its name to Industrial Products division.

Known as the Stokes division since 1950, when the Stokes Rubber Co. was acquired by The General Tire & Rubber Co., the Welland operations have been expanded into a major supplier of the automotive, refrigeration, appliance, and communications industries of Canada.

The Industrial Products division operations include extensive manufacturing in custom designed, molded, and extruded rubber, molded and extruded plastics components, and also an exacting service for precision tooling.

It was announced that the Welland operation has been affiliated with Industrial Products division of the parent company, The General Tire & Rubber Co., Akron, O., and is a major factor in one of the parent company's largest manufacturing set-ups.

In recognition of the growth of its Industrial Products division, the parent company recently named Oliver G. Vinnedge as vice president in charge of both sales and manufacturing. His responsibility includes the division's plants at Wabash, Logansport, and Marion, Ind., as well as the Welland plants. Mr. Vinnedge, prominent for many years in the rubber industry, joined General Tire on November 1, 1957, after having been in executive capacities for 33 years with the Dryden Rubber Division, Sheller Corp.

Esso Research & Engineering Co. has moved its executive offices from New York, N. Y., to Linden, N. J. The move, involving 30 top executives and administrative personnel, has completed the company's headquarters move to its main site, the 56-acre Esso Research Center. The research firm, central scientific affiliate of Standard Oil Co. (N. J.), employs about 3,000 persons.

The Stillman Rubber Co., Culver City, Calif., has developed a new compound from fluorinated silicone rubber which has excellent high- and low-temperature fuel and oil resistance. Designated TH 1057, the new 70 SDH compound resists extrusion into clearances and is resistant to a variety of hard-to-seal fluids, air, and fuel and air mixtures from a minus 80° F. to 400° F. It is intended for use as O-rings and other pressure-type seals where the conventional fluorinated silicone elastomer has been unsuccessful because of low modulus.

Brush-Beryllium Co.'s new $4½-million Elmore, O., plant has begun producing the first of 500,000 pounds of beryllium under a five-year contract agreement with the Federal Government. At the plant, beryl ore will go through a series of Brush-developed chemical and metallurgical processes in tanks rubber lined by the B. F. Goodrich Co., Akron, O. In all, 56 of the maze of tanks to be used were lined exclusively by Goodrich. Because of the corrosive nature of the process liquids, rubber lining, specially made for each liquid, was necessary in most of the tanks, which vary in size from 16 by 11 feet to three by three feet. Most of the rubber lining used is 3/16-inch thick although in some instances ¼-inch was required. The types of lining used included Triflex, a special Triflex with a water-resistant surface layer, and Sper Flexite A.

J. M. Huber Corp., New York, N. Y., is producing a new spray-dried form of Zeolex 23 that is said to save more than 20% in shipping and storage space. It is easier to handle: the tiny beads pack tighter, are less dusty and are freer flowing than powdered Zeolex. Zeolex 23 is a widely used white reinforcing pigment for sole and heel and light-colored mechanical goods. It is also used by the paper industry as a brightening agent. Packaged in 50-pound bags, the product is available in carload quantities from Huber's Chemical division plant at Havre de Grace, Md.

Pequanoc Rubber Co., Butler, N. J., a wholly owned subsidiary of Amerace Corp., New York, N. Y., will not rebuild its reclaim and compounding facilities at Butler which were destroyed by fire on February 26, 1957. This decision will not affect Pequanoc's new compounding plant in Tallapoosa, Ga., which will continue to produce and sell compounds.

B. F. Goodrich Industrial Products Co. recently decided to centralize its molded rubber sundries manufacturing at the main B. F. Goodrich plant in Akron, O. The company has been producing such molded goods as water bottles, ice caps, throat collars, and bulb-type syringes at its Plant 4—located about a mile from the main plant. The move of equipment and other facilities is expected to take 12 months, with no interruption in production or service. It comes on the heels of a modernization program at the firm's Riverside, N. J., plant, where such items as surgeons' and household gloves are manufactured.

Seiberling Rubber Co., Akron, O., has teamed up with the National Safety Council to prepare the course on the right way to drive on ice and snow, which includes a short motion picture and instruction material for teachers. The company said the film, "How to Drive on Snow and Ice," is available for loan to the more than 10,000 U. S. high schools that sponsor driver education classes. A 38-page teacher's manual is sent free with the film. School officials can get the film and manual by writing the Seiberling public relations department at Akron, O.

The Firestone Tire & Rubber Co., Akron, O., has been awarded a contract for the modification of launching elements involving improvements in both mechanical and electronic elements of the U. S. Marine Corps Terrier land-weapons system. The Terrier is a surface-to-air missile designed to intercept aircraft at longer ranges and higher altitudes than anti-aircraft guns. The modification hardware for the launching system elements will be fabricated under a Navy contract at Firestone's Los Angeles plant.

Shell Chemical Corp. has installed a Beckman IR-4 infrared spectrophotometer in an expanding program of synthetic rubber research at Torrance, Calif. The research work involves a study of the chemical properties of all the raw materials used to produce butadiene and styrene, as well as the various types of finished copolymers. The new Beckman IR-4 will be used for identification work and quantitative and structural analyses.

Chicago Rawhide Mfg. Co., Chicago, Ill., has announced the availability of a full range of C/R industrial O-rings in standard sizes and compounds. The addition of standard-size O-rings to the C/R line was a natural development after years of experience in designing and compounding special O-rings to solve special sealing problems. Complete information on sizes and compounds available in the new series is given in C/R Bulletin OR-57, available upon request.

Insul-Mastic, Inc., Summit, Ill., is producing a white mastic coating which can be utilized in the waterproofing, insulation and beautification of concrete surfaces, tile roofs, and masonry buildings. Marketed under the trade name Insul-Mastic, the coating material, which is based on Pliolite S-5, a styrene butadiene resin of The Goodyear Tire & Rubber Co.'s chemical division, has had success in many southern Florida installations, particularly in lowering air-conditioning requirements.

Dajac Laboratories, Borden Co., chemical division, New York, N. Y., are producing finished plastic scintillator compositions for the ultra-sensitive detection of nuclear radiation for use by scientists working in the atomic energy field. These materials are reported to fulfill adequately the requirements for this application by having high pulse heights relative to anthracene and by having short decay periods. Dajac plastic scintillators are available in a variety of shapes, forms, and sizes, including rods, spheres, blocks, sheets, powders and wells. Improved manufacturing methods permit production of scintillators of very large size. Besides Borden's standard compositions, scintillators with special primary and secondary solutes can be supplied on request.

Battelle Memorial Institute, Columbus, O., is the site of an information center established by the Air Force to gather and disseminate data concerning the effects of nuclear radiation on materials and systems which may be required in aircraft in the future. It will be known as the Radiation Effects Information Center. As nuclear-propelled aircraft will need radiation-resistant materials, components, and equipment, the Air Force believes it essential that the latest information on radiation effects be made available in useful form to aircraft designers, equipment engineers, and others concerned with radiation-effects research. The REIC at Battelle will compile, evaluate, and summarize all pertinent data and make it available to those designated by the Air Force.

The Uniflow Mfg. Co., Erie, Pa., manufacturer of water-conditioning equipment, has found the answer to a vexing insulation problem long faced by the firm—to satisfy a consumer demand for an electric water cooler which would not leak water on the floor beneath the cooler. Several months ago Uniflow began using tubing of closed cellular rubber, a material produced by the Rubatex division of Great American Industries, Inc., Bedford, Va., to prevent condensation, dripping, and subsequent puddling. Reasons for switching to Rubatex tubing include initial cost savings, anticipated longevity of the material, and the capacity of closed cellular rubber to resist moisture.

The B. F. Goodrich Co., Akron, O., has made tuition-sharing grants to 43 colleges and universities in 20 states under its Aid-to-Higher Education program in the last year. A total of 585 employes participated in the program during the 1956 fall semester through the 1957 summer term. Cost-of-education grants equal to 50% of tuition and laboratory fees are made to the schools employes attend. The company also shares the cost of tuition and laboratory fees with the employes. The Goodrich educational program also includes four-year scholarships to qualifying high school graduates selected by the National Merit Scholarship Corp. and grants to colleges and universities for designated research and development.

The Martin Co. has developed a recovery kit, consisting of parachutes and rubberized-fabric air cushions, which permits reuse of the U. S. Air Force's TM-76 Matador guided missile for training and test purposes. Specially adapted for the Matador by the aviation products division of The Goodyear Tire & Rubber Co., Akron, O., the air cushions are inflated by compressed air. Made of neoprene-coated nylon fabric, the cushions are highly stressed and high temperature resistant. They—and the parachutes—are reusable, too.

B. F. Goodrich Canada, Ltd., Kitchener, Ont., recently opened its new $500,000 Toronto headquarters building, at Jutland Road, Etobicoke Township, which is expected to speed greatly the flow of product shipments in the Toronto area. The buff brick and glass construction and the ground approaches include individual approaches and parking areas for customers and employes, a 75-by 30-foot shipping dock, 10 loading or unloading outlets, and warehousing storage to a height of 18 feet.

Raybestos-Manhattan, Inc., Passaic, N. J., recently shipped a conveyor belt, believed to be the world's largest, which measured 2,940 feet long, or more than one-half mile. It was wound on a reel just under 13 feet in diameter, the largest permissible by rail. This large diameter also necessitated a special lo-bed railroad gondola to provide adequate clearance at the overpasses and tunnels. The conveyor belt, for a prominent coal mine, was made of plies of special high-tensile fabric and with a thick abrasion cover.

Mitchell Enterprises, Inc., Denver, Colo., a new firm headed by Lee W. Mitchell, formerly manager of all tire research and development for Gates Rubber Co., Denver, is believed to be the first of its kind in the nation to offer a unique consultation service on tire purchasing and usage to commercial concerns using fleets of vehicles. The aim of the new company is to counsel with companies on tire problems such as purchasing methods, types and care of tires, and record systems for cost accounting.

Dunlop Tire & Rubber Corp., Buffalo, N. Y., is marketing a quality and economy-priced dry-charged battery for budget-minded buyers. Designed for those requiring an economy battery, the battery is covered by a company guarantee and adjustment policy. From the dealer's angle, Dunlop points out, the new economy-level battery will remain factory-fresh indefinitely, requires no booster charge, and no investment in expensive trickle-charge or maintenance equipment.

Tire dealers from many parts of the United States will return to school February 3 to 8. The reason is the fourth annual Tire Dealers' Management Program sponsored by the University of Akron College of Business Administration. Dean Warren W. Leigh expects approximately 60 dealers to take part in the program. The Akron U project, first of its kind in industry, was begun in 1955 as a forum for the exchange of creative ideas in tire merchandising. Additional information on the program and registration procedures may be obtained by writing to Dean Leigh, College of Business Administration, University of Akron, Akron, O.

B. F. Goodrich Tire Co., Akron, O., has stated that the growing number of rubber covered wheels on American farms is a measure of the progress in farming that has occurred in the past 50 years. George H. Richard, manager of farm tire sales for the company, recently told the Illinois Retail Farm Equipment Association that today there are 38 rubber-tired wheels on the average Midwest farm. Fifty years ago not one farm tool was equipped with pneumatic rubber tires, he reported.

The H. O. Canfield Co., Inc., Bridgeport, Conn., has announced the development of a fluorocarbon rubber compound that shows excellent resistance to many petroleum oils, synthetic lubricants, silicate esters and aircraft fuels covering a temperature range from about 50° F. to more than 500° F. The compound should be of considerable advantage to applications requiring maximum resistance to deterioration by heat and functional fluids. Exhaustive laboratory and field tests are being conducted on jet aircraft engines and other mechanical devices where high temperatures are encountered during operation.

Sinclair Chemicals, Inc., New York, N. Y., a subsidiary of Sinclair Oil Corp., has announced a program to expand its petrochemical activities by marketing high-purity propylene, the basic raw material required for the manufacture of a new plastic. The propylene will be produced in a new plant at the Marcus Hook, Pa., refinery of Sinclair Refining Co. This new plant will be the first high-purity propylene plant constructed in North America specifically for the manufacture of plastic-grade propylene and will constitute the source of raw material for the new polypropylene plastic plant recently announced by the Hercules Powder Co.

Foster Wheeler Corp. has announced that its New York offices are now located at 666 Fifth Ave., New York 19, N. Y.

Imperial Paper Color Corp. (Canada) Ltd., St. Johns, P.Q., a subsidiary of Imperial Paper & Color Corp., Glens Falls, N. Y., has entered into an agreement to purchase the dry color manufacturing facilities of Sherwin-Williams Co. of Canada, Ltd. This agreement also includes the purchase of the latter's good will, customer lists, and manufacturing procedures for dry colors, but does not include any other activities of Sherwin-Williams of Canada, which will discontinue all dry color operations. Imperial will move the equipment it has purchased to its new St. Johns color plant.

Goodrich-Gulf Chemicals, Inc., Cleveland, O., has announced that the first of several overseas shipments of American-made butadiene by barge has been shipped from Port Neches, Tex., to Ravenna, Italy. Manufactured in Port Neches the 2200-ton cargo required 35 days to dock-side in Ravenna and is an experiment in long-distance transportation by barge. The butadiene is required in the manufacture of SBR now being produced in Italy by ANIC, a private company. The barge shipment was made for Goodrich-Gulf Chemicals by Warren Petroleum International Corp., Tulsa, Okla.

Bettis Rubber Co., Whittier, Calif., has purchased Plastic & Rubber Products Co.'s Houston, Tex., plant. The facility will be known as The Houston Rubber Co.

Wyandotte Chemicals Corp. has announced plans for construction of a new propylene oxide plant at the company's Wyandotte, Mich., works. Full-scale operation is expected to begin early in the second quarter of 1958. The new plant, which will utilize the chlorohydrin process, will also produce propylene dichloride and dichloroisopropylether. Wyandotte's Pluronic series of block polymers, including the polyurethane-foam grades, require the highest purity of propylene oxide commercially available in their manufacture.

The Firestone Tire & Rubber Co.'s Des Moines, Iowa, plant has installed 13 automatic presses for curing large farm-tractor tires. The new curing line consists of 75-inch steam Bag-O-Matic presses. Bag-O-Matics for passenger-car tires have been in use in Firestone plants for several years.

California Rubber Products, Inc., Hawthorne, Calif., has moved its general offices from its two plants to 1754 S. Crenshaw Blvd., Torrance, Calif. The new property consists of 46,000 square feet with a 25,000-square-foot building together with an option on an additional 40,000 square feet for expansion.

Beckman Instruments, Inc., South Pasadena, Calif., has announced that construction is well under way on a $250,000 manufacturing plant at Glenrothes, Scotland, which will house the company's newly formed subsidiary, Beckman Instruments, Ltd. This subsidiary is the company's second wholly-owned foreign subsidiary. The first, Beckman Instruments, G.m.b.H., in Munich, Germany, was established in 1954 and now employs 300 persons in the manufacture and distribution of electronic instruments and components.

Firestone Tire & Rubber Co. has begun production in two new tire plants, one in Havana, Cuba, and one in Manila, Philippine Islands. The Havana plant will produce passenger, truck, and off-the-highway tires for Havana's growing motor vehicle population. About 500 Cubans will be employed at the plant. The Manila plant is the first to be put into operation by Firestone in the Far East. It will supply passenger and truck tires for Philippine automobile assembly plants and replacement tires for retail outlets in the Philippines. Most of the 300 employes have been hired locally. A 1,000-acre natural rubber plantation is being prepared near the new plant to supply raw materials for tires manufactured there. J. N. Vaughan has been named managing director of the Manila plant; R. L. Raines, managing director of the Cuban plant. W. R. Emig is factory manager, and R. D. High is production manager of the Manila plant; while H. H. McCallister has been named factory manager, and W. G. Chester, production manager of the Cuban plant.

B. F. Goodrich Aviation Products, Los Angeles, Calif., is building to a Northrup design flexible rubber fuel cells which provide a continuous fuel source for the U. S. Air Force's Northrup T-38 supersonic jet trainer during dive, climb, or inverted attitudes. The new type is actually a fuel cell within a fuel cell. An inner cell traps a supply of fuel at the fuel pump, located within the inner cell, regardless of how far away from the pump the fuel contained in the larger, outer cell may be forced by gravity.

Resin Research Laboratories, Inc., Newark, N. J., has formed a new division devoted to market survey and sales development related to resins and polymers, their related raw materials, and their multiple applications. This service will be extended throughout the world. Emphasis will also be placed on motivation research in reference to sales in the above fields. The organization of this division will be such that branch facilities will be available in Newark and Chicago, as well as the West Coast.

Monsanto Chemical Co., plastics division, Springfield, Mass., has announced a major increase in compounding capacity for polyvinyl chloride. Equipment recently installed at the plant is capable of boosting the firm's compound production by 75%. Martin G. Caine, sales manager for vinyl resins and compounds, said the capacity step-up was necessary to keep pace with sharply increasing demands for the company's vinyl compounds for molding and extrusion.

NEWS about PEOPLE

D. B. Benedict has been elected a vice president of Union Carbide Corp., New York, N. Y., and will be responsible for the corporation's chemicals and plastics activities. Succeeding Benedict as president of Union Carbide Chemicals Co. is **E. E. Fogle. H. D. Kinsey** has been named president of the newly formed Union Carbide Olefins Co., a division of the corporation which will handle the production and sale of ethylene, propylene, butadiene, and other hydrocarbon products.

John F. Davis has been appointed technical director of the Arizona Chemical Co., jointly owned by American Cyanamid Co. and International Paper Co. Davis will make his office at the company's New York headquarters, 30 Rockefeller Plaza. The company produces tall oil products and tall oil resins that are widely used by paint and varnish producers as well as in the soap, surface coating, and chemical and paper industries.

M. E. Baily, has been appointed general manager, industrial products sales division of B. F. Goodrich Canada, Ltd., Kitchener, Ont. He was previously manager of belting and hose sales.

William N. Hanford, Olin Mathieson Chemical Corp., received honorary membership in the American Institute of Chemists at a dinner meeting, December 12, at the Hotel Commodore, New York, N. Y. Dr. Hanford addressed the group on the "Need for Prescience in Organic Chemistry."

William B. Hullhorst will head a newly formed department as chief engineer in charge of research and development at the Ladd, Ill., plant of Illinois Industrial Rubber Co. The company and its associate, The Toledo Industrial Rubber Co., Toledo, O., have organized the new department, devoted primarily to the development of new machines and methods for the production of long-run, high precision molded mechanical goods. Mr. Hullhorst has been active since before 1930 in engineering and management work in the rubber, plastics, and glass industries in the Toledo area.

F. Visser't Hooft, R. T. Browning, P. E. Sharts, and **M. N. Tiernan** have been elected to the board of directors of Wallace & Tiernan, Inc., Belleville, N. J. The action, taken at the directors' December 5 meeting, increases the board from 10 to 14 members.

Lucius Gilman, past consultant for the Materials Advisory Board of the National Academy of Sciences and former chief of the Ordnance Corps plastics laboratory, has joined Monsanto Chemical Co. as manager of plastics and polymer research in the special projects department of the company's research and engineering division at Everett, Mass. Throughout his career, Dr. Gilman has been engaged in research in the physical properties of plastics under severe conditions of use.

Bertram K. Denton will become vice president and a director of Monsanto Chemical Co.'s Japanese associated company, Monsanto-Kasei Chemical Co., which was formed in 1952 by Nipponkasei Chemical Industries, Ltd., Tokyo, and Monsanto Chemical Co., St. Louis, Mo.

Carlton Gilbert, director of advertising, United States Rubber Co., New York, N. Y., has been appointed chairman of the Association of National Advertisers Cooperative Advertising Service Committee, New York.

Joseph C. Kay has retired from the Baker Castor Oil Co., Bayonne, N. J. Succeeding him as New England sales representative is **Henry J. Sevin,** a recent addition to the Baker sales staff. Sevin, for the past five years, was sales representative for Chas. Pfizer & Co., following a period as quality control chemist at that company's Groton, Conn., plant.

J. Wade Miller, Jr., manager of the industrial relations department, has been named manager of the central services division, Dewey & Almy Chemical Co., Division of W. R. Grace & Co., Cambridge, Mass. He will be in charge of advertising, industrial relations, marketing research, office services, public relations, and purchasing.

Harold E. Bechtold, Jr., has been appointed a plastic materials sales representative for B. F. Goodrich Chemical Co., Cleveland, O. He will make his headquarters in the company's Los Angeles, Calif., district sales office and will also represent the general chemicals sales department in the West Coast area.

Harold E. Bechtold, Jr.

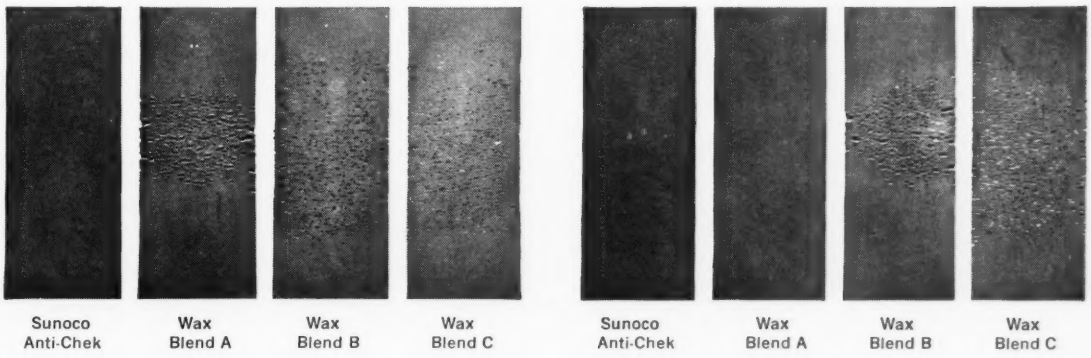
T. Lipsky has joined the staff of Fullerton Mfg. Co., Fullerton, Calif., as chemist.

Thomas E. Smith and **Walter J. Blaha** have joined the chemical plant engineering department of Pittsburgh Coke & Chemical Co., Pittsburgh, Pa. Mr. Smith enters the department's process improvement section as a chemical engineer; while Mr. Blaha will be maintenance engineer of the chemical plant's maintenance engineering department.

Arthur N. Stuart, former Detroit district manager, has been named sales manager of The Firestone Tire & Rubber Co.'s manufacturers sales department. He succeeds **W. D. Gohr,** now sales manager of the Airide springs division. Stuart will be responsible for original-equipment tire sales to automotive firms.

Alan G. Richards has been appointed manager of client relations, Bjorksten Research Laboratories, Madison, Wis. He will make his headquarters at offices of the company at 412 Fifth St., N. W., Washington, D. C. His new assignment will embrace client relations with both industry and government.

N. Stingley, formerly with Fullerton Mfg. Co., is now with Bettis Rubber Co., Whittier, Calif.



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The controlled blooming rate of Sunoco Anti-Chek® gives *predictable* long-life weather-protection to your finished rubber products. Unlike ordinary waxes, that bloom too fast to last, Anti-Chek blooms at the optimum rate for longest service life. Result: You need *less* Sunoco Anti-Chek to get *better* resistance to sunlight, ultraviolet light, and ozone than ordinary waxes can provide.

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AGENTS AND DISTRIBUTORS THROUGHOUT THE FREE WORLD

News about People

W. F. Tuley has been appointed to the new post of group manager, chemical development, for the Naugatuck Chemical division, United States Rubber Co., New York, N. Y. Dr. Tuley will coordinate research and development on agricultural chemicals, rubber chemicals, heavy chemicals, chemical intermediates, and chemicals used in plastics.

Neil Pestal has been promoted to chief chemist, The Firestone Tire & Rubber Co., Los Angeles, Calif., succeeding **R. L. Hutchins,** who retired November 1.

Theodore W. Hummel has been named a plastic materials sales representative for B. F. Goodrich Chemical Co., Cleveland, O. He will make his headquarters in the company's New York, N. Y. district sales office.

Theodore W. Hummel

Clifford O. Eddy, Jr., and **Eugene J. Sehm** have joined the B. F. Goodrich Research Center, Brecksville, O., as technical men; while **Charles R. Ensign** has signed up as a junior technical man.

Robert F. Gosselin has been named purchasing agent for National Polychemicals, Inc., Wilmington, Mass. The company manufactures chemicals for the rubber, plastics, and related industries.

Norman E. Hathaway has been elected director and vice president-marketing for Oronite Chemical Co., San Francisco, Calif. Prior to this he was director, Chemical and Rubber Division, Business & Defense Services Administration, United States Department of Commerce, Washington, D. C., and prior to that time he had been general sales manager of Oronite.

G. C. Zwick has been appointed special field representative for The Goodyear Tire & Rubber Co.'s chemical division. With headquarters in Chicago, Ill., he will provide sales and technical service for the high polymer resins, rubbers and latices marketed by the division.

G. C. Zwick

George A. Watt has been named chief chemist at The Rubber Corp. of California, Garden Grove, Calif.

Willard Stewart, Inc.

R. Scotton Griffin

R. Scotton Griffin has been promoted to assistant manager of the Akron district of the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. He is being assigned to succeed **W. Newlin Keen,** transferred to the elastomers laboratory in Wilmington. The new assistant manager has been a sales representative in the department's eastern district.

J. Arnold, Jr., has been named manager of the Boston office of Enjay Co., Inc., petrochemicals marketing firm. He will be responsible for Enjay's sales and other activities in the New England area.

William H. MacKay has been appointed vice president of industrial and public relations and secretary of the Dunlop Tire & Rubber Corp., Buffalo, N. Y. He succeeds **John F. McCann,** who retired because of ill health.

Onslow B. Hager has been elected a vice president of Alco Oil & Chemical Corp., Philadelphia, Pa. Dr. Hager has been director of research at the firm since 1947 and for 12 years prior to that had served as head of one or more textile laboratories of Rohm & Haas Co.

Onslow B. Hager

Lewis M. Ludlow has been named special technical representative attached to market developments for the Michigan Alkali division, Wyandotte Chemicals Corp., Wyandotte, Mich. He is succeeded by **John A. Bucher** as sales representative on the West Coast. In his new position, Ludlow will concentrate on the field of polyurethanes and the part Wyandotte products, such as the Pluronic series of block polymers, play in this relatively new and growing field.

W. R. Clark has been named sales manager in the plastics sales division, Phillips Chemical Co., Bartlesville, Okla.; **W. H. Guthrie** has been named manager of sales promotion; while **R. M. Wallace** becomes sales coordinator; and **D. S. Sherwin** becomes manager of marketing research. **R. V. Jones** continues as manager of technical services and development.

Janu

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POLYMEL DX III Promotes dispersion of all types of rubber fillers • Aids flexibility • Excellent extrusion • Noted for Flex-crack performance • Good abrasion and tear resistance • Better aging • No coloring property • Low Mooney

PROPERTIES

Natural State	Powder
Color	Amber
Specific Gravity	1.11
Melting Point	Pressure Sensitive
Composition	Modified Polystyrene
Odor	Characteristic
Toxicity	Not Known to be toxic

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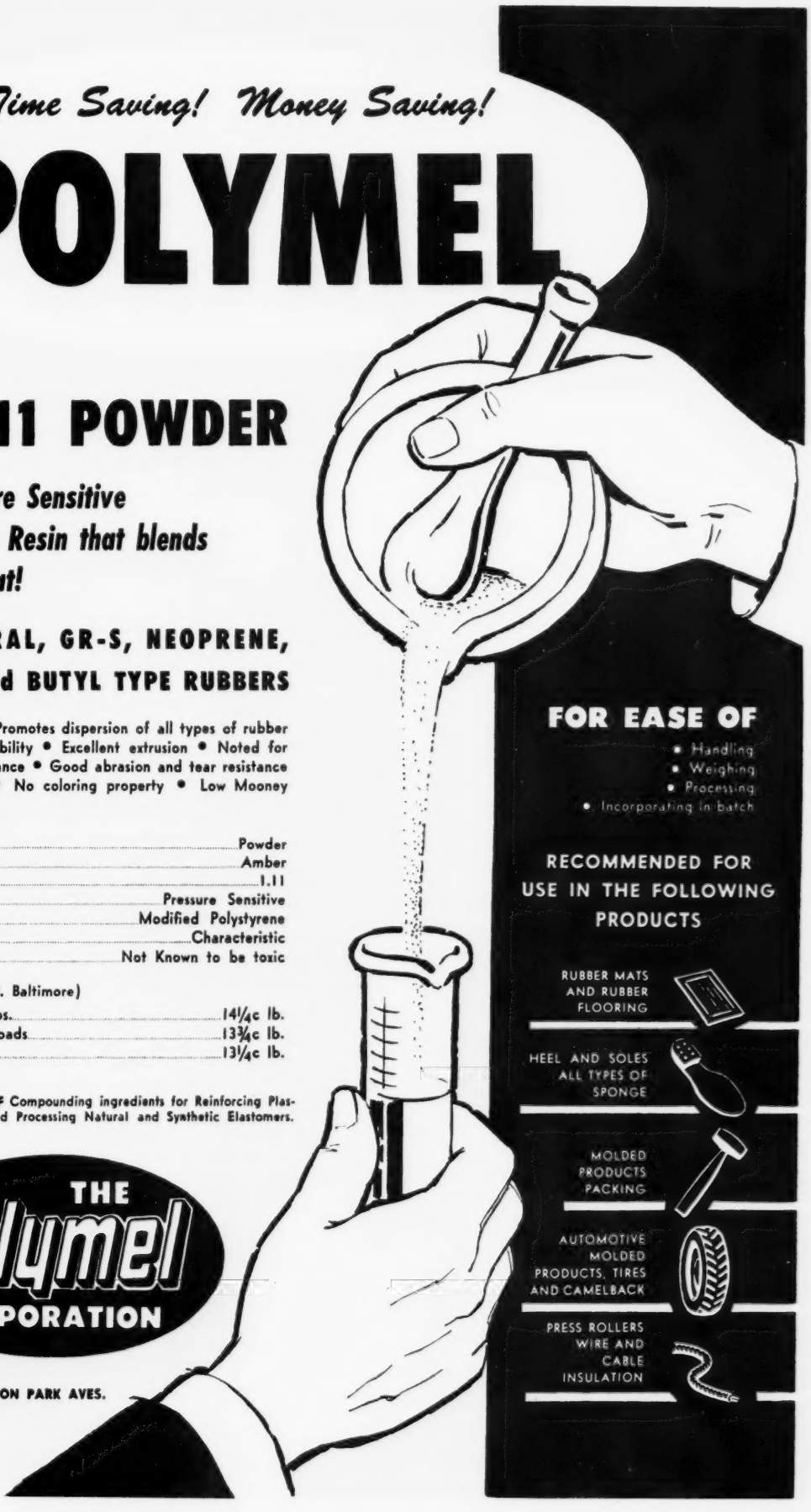
1 drum to 4900 lbs.	14¼c lb.
5000 lbs. to truckloads	13¾c lb.
Truckloads	13¼c lb.

MANUFACTURERS OF Compounding ingredients for Reinforcing Plasticizing, Extending, and Processing Natural and Synthetic Elastomers.



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News about People

Emery Parker has been appointed to the newly created position of director of chemical market development, Wallace & Tiernan Inc., Belleville, N. J. Dr. Parker's responsibilities will include development of markets for new products and extending the markets and uses of basic chemicals and chemical intermediates now produced by the company.

G. H. Short has been named plant manager of Phillips Chemical Co.'s Plains butadiene plant, near Borger, Tex., and **C. W. Forman,** formerly at Dumas, has been named manager of the adjacent Plains copolymer plant. **H. D. Trotter** moves from Borger to become manager of Cactus plant near Dumas, where Phillips operates ammonia, ammonium nitrate, and nitric acid facilities.

W. F. Allen, R. S. Hammerness, J. A. Helm, Jr., J. F. Lombard, S. G. Panayides, and **W. H. Rogers** have joined the technical staff at the Institute, W. Va., plant of Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, N. Y.

Paul J. Pamer has joined the Akron, O., sales office of Columbian Carbon Co., New York, N. Y., after two years each in Goodyear production and the U. S. Army Signal Corp.

Charles A. Dana has been appointed sales coordinator of Goodyear Tire & Rubber Co.'s shoe products division. He will headquarter at the division's Windsor, Vt., factory and be responsible for liaison between sales and production, with particular emphasis on new products. The new position was created to provide better customer service.

Harold H. Helm, chairman of the Chemical Corn Exchange Bank, and **Malcolm P. Ferguson,** president of Bendix Aviation Corp., have been elected directors of United States Rubber Co., New York, N. Y.

Howard L. Young, vice president, American Zinc, Lead & Smelting Co., Columbus, O., has been elected a director of the company to fill the vacancy caused by the recent death of **Erle V. Daveler,** who was a director and a vice president. **Thornton Emmons,** also a vice president and a director, retired on January 1, but will continue as a consultant and as a director for an indefinite period.

Guilford G. Johnson, who has headed all advertising activities of the Wooster Rubber Co. for the past nine years, has been named general merchandising manager of the Wooster, O., company.

Emery Parker

Paul J. Pamer

Obituary

Paul Ingold Murrill

Paul Ingold Murrill, former research director of the R. T. Vanderbilt Co., New York, N. Y., died December 11 at his home in Norwalk, Conn., at the age of 82.

Born in Hickory, N. C., he obtained his B.S. degree from the University of Kentucky in 1895. After a year of graduate work at his Alma Mater, he continued his studies at Michigan and received his Ph.D. in 1899.

Dr. Murrill served for a year as associate professor of chemistry at Alabama Polytech, after which he held a number of industrial positions. These included work with the United States Department of Agriculture, E. I. du Pont de Nemours & Co., Inc., United States Rubber Co., Tennessee Copper Co., Federal Dye & Chemical Co., and R. T. Vanderbilt Co. His active association with Vanderbilt began in 1920 and terminated when he retired in 1940. During his industrial career, he obtained 20 patents, a number of which were important contributions to the rubber industry in the fields of vulcanizing agents, accelerators of vulcanization, and antioxidants.

During his active career Dr. Murrill was a member of the American Chemical Society, American Institute of Chemical Engineers, the Chemists' Club of New York City, and a number of social organizations.

He is survived by his wife.

Mexico

Tire Industry Gains

Mexico's rubber industry in 1956 showed an overall improvement almost entirely due to increased activity in the tire industry, which more than offset declines in other branches (heels and hose), as the table at the bottom of the page demonstrates.

The drop in rubber heels and hose is ascribed to the encroachment of similar articles made of "substitutes for rubber."

Imports of crude natural and synthetic rubber into Mexico during the first half of 1957 decreased sharply, as compared with those for the same period of 1956. The respective amounts were 10,157 metric tons, valued at 73.2 million pesos, against 12,321 metric tons, valued at 103 million pesos, a reduction of 17% in volume and 21.3% in value. The arrivals in the month of June, 1957, alone showed a decline of almost 1,000 tons, or 40% from the total for the same month in 1956.

MEXICAN RUBBER GOODS OUTPUT, 1955-1956

	Production		Difference (%)
	1955	1956	1956/1955
Tires for automobiles and trucks	94,000	350,000	+272.3
Tubes for automobiles and trucks	510,000	584,000	+14.5
Bicycle tires	893,000	931,000	+4.3
Tubes of bicycles	40,000	65,000	+62.5
Heels, prs.	16,737	16,000	—1.3
Hose, meters	993	904	—9.0

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NEWS from ABROAD

India

High Polymer Symposium

A symposium on high polymers and an exhibition by the plastics, rubber, synthetic fiber, and allied industries, organized by the National Chemical Laboratory, Poona, were held in that city during March 2-5, 1957.

Well over 150 delegates from all parts of the country attended the symposium, inaugurated by M. S. Thacker, general director of the Council of Scientific and Industrial Research, New Delhi. The guests to the symposium were welcomed by G. I. Finch, director of the National Chemical Laboratory.

Altogether 84 papers were read; the 16 coming under the rubber section discussed, among others, such topics as the effects of gamma radiation on rubber, polymer-modified rubber, mechanical properties of elastomers under high pressure and supersonics, and a new type of fluid rubber.

It was made clear at the symposium that India fully recognizes the importance of applied scientific research in industry. In line with its program for rapid industrialization of the country, the government, through the Council of Scientific & Industrial Research, has already established a chain of 17 national laboratories, each specializing in a specific aspect of applied research. The science and engineering faculties of the Indian universities, hitherto devoted mainly to fundamental research, are now beginning to train men and women for work in industry. Industrial units are being encouraged to cooperate in financing research on problems of interest to them.

Incidentally, the rubber industry took the opportunity at Poona to pass a resolution to form a Rubber Manufacturers' Cooperative Research Association.

New Developments

Possible new developments in and for the rubber industry were actively discussed at the Poona symposium. A. Seetharamiah, Development Officer (Rubber), intimated that India's raw rubber requirements are expected to exceed 45,000 tons by 1960 and may go as high as 60,000 tons under the right conditions. A considerable proportion of this rubber would have to be synthetic rubber.

At the same time, consumption of carbon black, now about 7,500 tons, would probably go to about 11,500 tons. At present, imports supply almost all requirements of carbon black, but the possibilities of local production of suitable grades of this material as well as of other rubber chemicals—particularly accelerators and antioxidants—are being explored. In this connection, it is learned that the German firm, Farbenfabriken Bayer, is collaborating with M/s Ruias, Bombay, in the establishment of two chemical plants, one in Bombay and the other in northern India. The government may also start a plant for rubber chemicals.

The manufacture of textiles for the rubber industry, tire cord, and reclaimed rubber are other fields in which local enterprise is expected to take a more prominent part in future.

Expansion in the production of rubber goods, particularly automobile tires, is also on India's programs. Dunlop recently was permitted to start a new tire factory at Madras, and it is reported that three more tire plants may be licensed by the Indian Government shortly. The Italian firm of Ceat has been mentioned in this connection; it seems it is to collaborate with the important Indian steel firm of Tata in setting up a factory; a second would be started by a group of Calcutta manufacturers jointly with another European tire company; a third, which is to have American technical aid, has reportedly already been licensed to operate in Kerala, the South Indian rubber-growing center.

According to figures published in *Rubber India*,[1] India's tire output in 1956 included 854,000 automobile tires and 833,100 tubes; 6,306,000 cycle tires and 6,473,500 tubes; 30,771 tractor tires and 31,593 tubes; also 3,716 airplane tires. Compared with totals for 1955, automobile tires show a decrease of 3%; tubes, an increase of 6%; cycle tires went up amost 10%, and cycle tubes nearly 16%. Production of footwear, which ranks after tires as the most important branch of rubber manufacture locally, came to 36,210,000 pairs in 1956, against 34,920,000 pairs the year before. The tire and footwear industries account for 68 and 13%, respectively, of the total consumption of rubber in India.

[1] July, 1957, p. 16.

Productivity Mission To Japan

The Indian Government, also striving to increase productivity, sent a mission to Japan in October, 1956, to study methods in that country. From the report on the mission's five-week tour[1] it appears that the delegates were much impressed by the change that has taken place since the end of World War II in the attitude of the Japanese toward industry. At the same time, what they note throws a light on Indian attitudes toward industry.

In Japan, we are told, the emphasis today is chiefly on efficient management, and most of the large companies are careful to separate ownership and financial backing from management and direction. The latter functions are now left to trained, full-time executives, the majority of whom hold no significant amounts of their companies' stocks. Most of the directors in the larger firms have come from subordinate positions in their respective companies, and family members (the "hereditary element") are taking a secondary place in management.

The Japanese are working hard to improve and maintain quality of export goods, and careful planning for production and processing control, as well as costing, is heavily stressed. A prominent feature of Japanese methods is the system of sub-contracting by larger to smaller firms.

Industrial research and design are receiving much attention. The Central Government maintains 11 national laboratories, mainly devoted to fundamental research. These have branches in various parts of the country which disseminate information primarily relating to operational research—to a large number of small and medium establishments. Most of the big companies have their own research laboratories, which in general absorb from 1.5 to 3% of their total personnel.

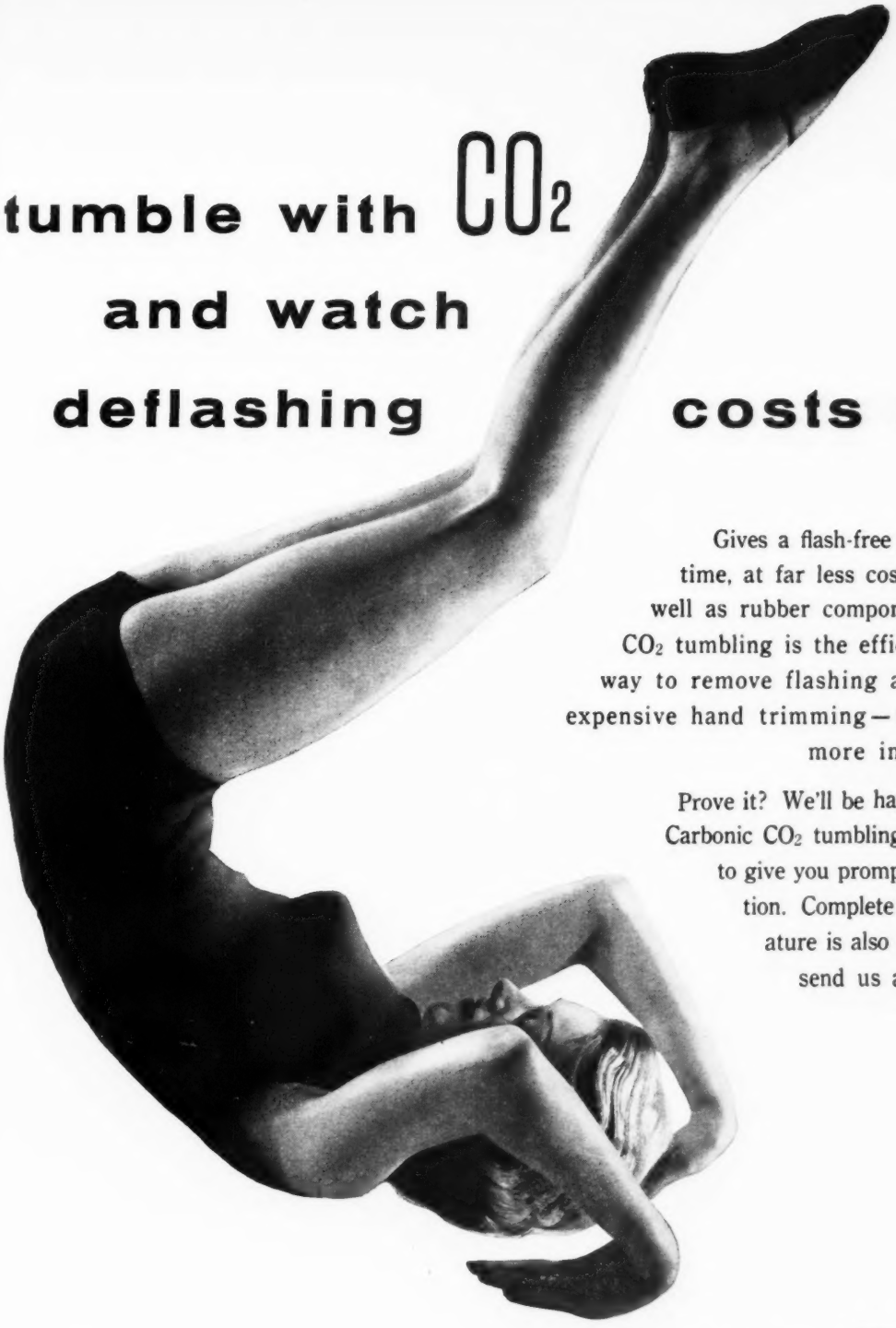
Intensive vocational and technical training at various levels is provided in nearly 300 public vocational training centers established all over the country since the end of the war, and suitable measures have been adopted to insure rational adjustment of supply and demand of skilled labor.

Every major city has municipal laboratories which not only assist the medium and small firms, but also permit investigators from private enterprises to use their facilities to work on their own special problems.

As compared with India, Japanese industrial productivity is of a very high

[1] *Indian Rubber Bulletin*, July, 1957, p. 31.

tumble with CO_2 and watch deflashing costs drop



Gives a flash-free finish in far less time, at far less cost. On plastic as well as rubber components and parts. CO_2 tumbling is the efficient, *automatic* way to remove flashing and rind. Ends expensive hand trimming—frees labor for more important work.

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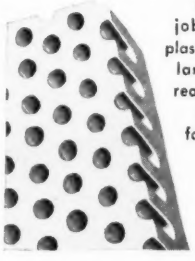

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order; however, it is said to be only one-fifth of United States productivity, one-third that of Britain, and two-fifths that of Western Germany, a situation which the Japanese Government is trying to remedy by the establishment of the Japanese Productivity Center. The Indian delegates have apparently been so much impressed with the work that this body is doing that they have recommended a National Productivity Council for India.

Malaya

GATT Considers Rubber Buffer Stock Plan

On his return from a recent General Agreement on Tariffs & Trade (G. A. T. T.) meeting, held in Geneva, Switzerland, the Minister of Commerce & Industry, Tan Siew Sin, commented that international action to prevent violent price fluctuations in rubber would probably be in the form of a rubber buffer stock like the buffer stock controlling fluctuation of tin prices. Rubber experts in Malaya seemed agreed that, desirable or not, such a scheme had little chance of success chiefly because the United States, with a stockpile of about 1,250,000 tons of rubber, was not likely to give it full cooperation, and without such cooperation, any buffer scheme was doomed to swift failure.

Later Mr. Tan explained that no formal proposal had been made at Geneva for an international buffer stock, though there seemed to be much sympathy for the idea from other primary producing countries and from some of the consuming countries. What is needed for rubber, he went on, is not so much a buffer stock scheme like the tin buffer, but some practical measures aimed at maintaining the price of natural rubber at a reasonable level in relation to synthetic rubber. He then added that the Federation Government had, in accordance with a decision by the International Rubber Study Group held in Java last May, just sent the controller of the Exports Commodities Division, P. F. Adams, to the United States to study the causes of rubber price fluctuations. Mr. Adams was to spend five weeks in America and then go on to Britain to continue his investigations there.

"Take-over" Speculators

Sterling rubber companies have warned the Federation Government against "take-over" speculators who buy estates though they have no stake in the country and no knowledge of planting. The object of these speculators, said Sir Leonard Paton, chairman of Harrisons & Crosfield, Ltd., in a recent report, is to gain control of the carefully built-up cash resources of the companies.

The "take-over" efforts are seen as part of a world-wide "subversion" of industries which started 1½ years ago. The method adopted by the speculators, is said to be to buy up 25% of a company's shares and then make a take-over bid.

British manufacturers have been hard hit by such financial moves. H. B. Hussey, a director of Harper, Gilfillan and Co., Ltd., Kuala Lumpur, said, and speculators have tried to control cash resources of tea and rubber plantations in Ceylon. The Ceylon Government controlled remittances sent abroad out of sales of tea and rubber estates, he added, but the Federation Government was unwilling to do the same for fear of discouraging foreign capital. The bids were made partly by Chinese and partly by other foreign capital, and Mr. Hussey warned that if the subversion of the rubber industry succeeded, unemployment, fragmentation, and mismanagement of estates would result.

Leading Malayan rubber firms and sterling companies in Britain owning estates in Malaya have taken steps to meet the situation; they have increased dividends, reduced reserves, and issued bonus shares to dispose of the surplus capital on which the speculators have their eyes.

The government, on its part, set up a special committee to study the problem, and its report and recommendations to check the spread of estate fragmentation and "take-over" speculators are expected to be published soon.

Wage Demands Renewed

Taking the position that rubber estate laborers "cannot afford to tie the wages to the fluctuating market price of rubber," the National Union of Plantation Workers is preparing to reopen the question of a minimum wage for the 250,000 estate workers it represents. The Malayan Planting Industries Employer's Association had rejected the proposal when it was put forward on a previous occasion. At the same time, the All-Malayan Estate Staff Union has been agitating for an increase of 30% in salaries for estate white-collar workers, and the question is to be arbitrated.

New Foam Rubber Firm

The increasing popularity of foam rubber for use in hospitals, hotels, etc., combined with the belief that Malaya is ideally situated for exporting high-grade rubber manufactures, has decided Fred. Waterhouse Co., Ltd., Singapore, to establish a new factory for foam rubber mattresses and seating, at Johore Bahru. The plant, which cost more than $500,000 (Straits currency) to build, is operated by an associated company, Waterhouse Rubber Products, Ltd., incorporated in Malaya. This company will, in future, be responsible for all manufacturing developments of the group.

France

Study Amine-Chlorinated Rubber Compounds

The effect of applying the Hofmann reaction (amination of alkyl halides) to halogenated rubbers has been studied at the Institut Français du Caoutchouc.[1] It was found that to attach NR_2 groups to the polyisoprene chain, it is necessary to make use either of the halogen addition compounds at the double-bond of the rubber or of partly chlorinated rubber.

In the case of brominated rubber, it was observed that two fractions form simultaneously, one of which is relatively insoluble, while the other is dissolved in the reaction medium. The insoluble fractions consist of hard powders, their degree of resistance to solvents and chemical agents, depending on the degree of degradation of the crepe used to prepare them. The soluble fractions, depending again on the condition of the crepe used, but also on the amine, range from powders to resins, which are easily gelified by aromatic solvents, are completely soluble in polar solvents, but insoluble in water. Only the results with secondary amines could be reported on for brominated rubber.

Substitution was found to take place more readily in the case of partially chlorinated rubber (35% Cl), but under all conditions, the result was a tertiary amine with three-dimensional lattice, completely insoluble in the reaction medium. This product is a hard brown, fairly coarse powder, wholly insoluble in organic solvents and affected only by acetic acid in presence of which it swells slightly.

None of the macromolecules obtained by the Hofmann reaction has elastic properties; so apparently vulcanizable elastomers cannot be prepared by the method. By varying the halogenated rubber and the amine, however, a wide range of products is produced which should find industrial application. It is suggested that the product from partially chlorinated rubber might serve for the manufacture of anion exchangers which are more efficient than those made from industrial 64% chlorinated rubber.

[1] *Rev. gén. caoutchouc*, 34, 4, 359 (1957).

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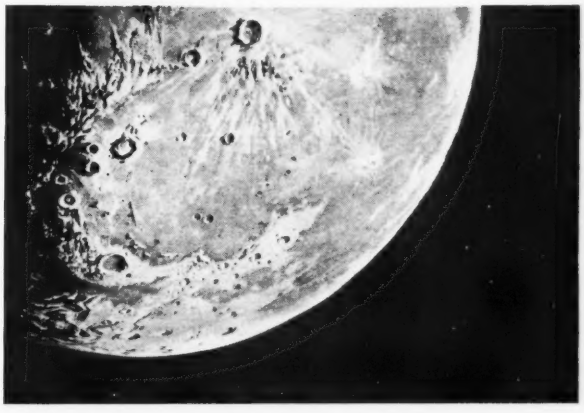

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These properties make Naugapol polymers ideal for use in the extruding of wire and cable insulation and the manufacture of mechanical rubber goods where low moisture absorption properties are required. For more details on these and other special grades of synthetic rubber, write us about your requirements.

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Cabot Black Plant Opens

The new carbon black plant which has been erected at Berre l'Etang, near Marseilles, for Cabot France S. A., French subsidiary of Godfrey L. Cabot, Inc., Boston, Mass., was formally opened in October by Thomas D. Cabot, president of the American parent firm. Initial output of the new enterprise will be 40,000,000 pounds annually and will include Vulcan 3 HAF and Sterling SO FEF blacks; Vulcan 6, ISAF black will also be produced in the near future. Cabot France will supply about 40% of French requirements of carbon black to begin with, but hopes soon to expand to meet the growing demands of the French rubber industry.

Germany

Technical Meetings Set

The European Congress of Chemical Technology 1958, to be held in conjunction with the Achema Congress 1958, in Frankfurt a.M., May 31-June 8, 1958 includes the following congresses and meetings:

Second Congress of the European Federation of Chemical Engineering, which will commence in Brussels, Belgium, on May 28 and continue in Frankfurt from May 30 to June 8.

Second Congress of the European Federation of Corrosion, Frankfurt, May 31-June 8, on "Corrosion and Chemistry."

Special Meeting and Lectures 1958 of the German Society of Chemists, June 4, when honors and awards will be presented for outstanding scientific work.

Annual meeting of Dechema 1958, June 3, devoted to "Nuclear Technology." Lectures on this subject will be jointly organized with the "Isotopen —Studiengesellschaft," which will hold its first annual meeting at this time.

Achema Yearbook Out

The Dechema (German Society for Chemical Plant) recently published the Achema Yearbook 1956/58, European Catalog of Chemical Plant, a volume of 1,070 pages. Presented in four languages, English, French, German and Spanish, the yearbook is designed to prepare visitors to the Achema Congress 1958. The book also offers information on 65 European technical colleges actively engaged in the field of chemical engineering, process technology, and industrial chemistry and gives particulars of the sources of supply of 7,500 types of equipment for chemical science and technology. This yearbook is being sent free of charge to all who have registered as visitors to the Achema Congress 1958 and will not be available from booksellers until after the Congress has taken place.

Particulars regarding participation in the Achema Congress 1958 and in the European Congress of Chemical Engineering may be obtained from Dechema, Deutsche Gesellschaft fur Chemisches Apparatewesen, Frankfurt a.M., 7.

Growth, Modernization Of Industry Progressing

Increased activity and improved methods in the rubber industry in East Germany were reported for 1956, and still greater advances in many directions are looked for by 1962 when the second five-year plan ends.

Keeping step with growing motorization, the tire industry has been going forward rapidly in recent years; production of tires for motor vehicles was up 310% in 1955 as compared with 1950 figures, and 1956 figures showed a further rise of 18.8% over those of 1955.

The industry, however, is hampered by the lack of standardization of tire sizes; early this year it was reported that almost 100 different sizes are being made in East German tire factories. The second five-year plan aims to change this situation; in line with its goal of greater mechanization in this and other branches of the rubber industry, it provides for the restriction of the manufacture of specified tire sizes to certain factories.

Manufacture of tubeless tires was started during 1956, and some have apparently appeared on the local market. Advances have also been made in the manufacture of cycle tires, annual output of which is now put at about five million units. Their quality and appearance are said to be up to world standard, and they have become an important export item.

Other rubber goods now exported by East Germany include Porocrepe (soling material), production of which is being increased, and Perlon (a nylon fiber) and rubber fire hose, claimed to be finding unusual favor in foreign markets. Perlon is also replacing cotton in the manufacture of conveyor belts for factories and mines.

Progress has also been made in other fields. A new factory for the production of foam rubber was started last year in Leipzig; mechanical goods for various industries have been making headway both as to quantity and quality. By 1962 the manufacture of airplane tires is expected to be double the 1955 figure, which would bring the quantity to well over 2,000,000 units. The rubber footwear industry is to be mechanized; VEB Tabarz has reportedly already taken steps to abolish handwork in its rubber shoe department, and other factories are scheduled to follow suit.

Expansion tempo is being delayed, however, by the fact that machinery for the rubber industry is still not available in adequate supply or design. But the new five-year plan is to improve this condition too; there is to be greater cooperation and coordination with Czechoslovakia's rubber and tire industry. The specialists of East Germany will contribute their long experience in processing synthetic rubber, and Czechoslovakia, its skill in the production of high capacity machinery, a field in which it has apparently made enormous strides forward in recent years. Soviet experts will aid these combined efforts with their experience in the mechanization of industrial processes.

Great Britain

Rubber Manuals

The Research Association of British Rubber Manufacturers, Shawbury, in conjunction with Maclaren & Sons, Ltd., London, publisher of *Rubber Journal*, has embarked on the important project of making available to the industry four technical manuals on subjects which the Association has investigated. Numerous papers and reports on these matters have already appeared, spread over a period of many years, but these are now to be collected and prepared in suitable form for the industry by members of the Association's staff.

The titles and approximate dates of publication of the manuals follow: "Conductive Rubber—Its Production, Application, and Test Methods," by R. H. Norman, senior physicist (October, 1957); "Ebonite," J. R. Scott, director of research (November, 1957); "Rubber Manufacture," W. C. Wake, head of research divisions (1958); "Principles of Compounding Vulcanized Natural and Synthetic Rubbers," R. C. W. Moakes, head of the technology division (in preparation).

Monsanto Developments

Tred 50 and Tred 85, styrene-butadiene resins, hitherto made by Monsanto Chemicals, Ltd., on a pilot-plant scale, are now available in commercial quantities from the company's factory at Newport, Monmouthshire. The chief application of these materials is in resin rubber, semi-expanded and micro-cellular shoe soling.

Another new development of the concern is the production in England of Santovar A, an antioxidant for unvulcanized rubber, which is claimed to be

(*Continued on page 632*)

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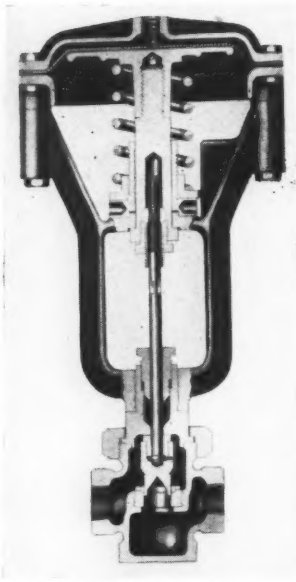
NEW EQUIPMENT

Sinclair-Collins Valves



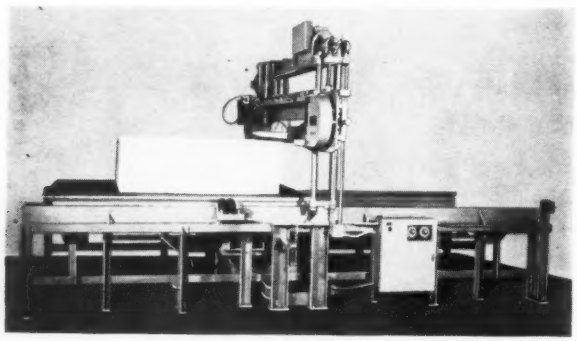
Sinclair-Collins valves

A complete line of diaphragm operated valves, designed for instrument-actuated control of temperature, pressure, or flow, has been announced by Sinclair-Collins Valve Co., Akron, O. Featuring exclusive V-port design, said to afford extremely precise modulation of flow because of its tapered variable port area, these valves are offered in both direct- and reverse-acting types. Intended for steam, air, liquid, or gas service up to 250 psi., the valves are available in sizes ranging from 1/16-inch through two inches NPT (direct acting) and 1/8-inch through two inches NPT (reverse acting). Instrument air-supply pressure requirements are from 2½ to 12 psi. for the direct-acting types to four to 13 psi. for reverse-acting valves. Spring tension is adjustable.

Cast valve bodies are of Navy M bronze; yokes and tops are high-quality valve bronze. Corrosion-resistant K-monel stem and 18-8 stainless spring are said to assure trouble-free service. According to the manufacturer, the cast Stellite V-port disk and Stellite-faced K-monel seat eliminate wire drawing or cutting, even in severest service. Stem packing is chevron Teflon asbestos.

Automatic Foam Cutter

Automatic equipment is being built by Falls Engineering & Machine Co., Cuyahoga Falls, O., to process 24-inch blocks of polyether foam, soon to be available from manufacturers. This new leveling and splitting machine will handle polyether foam blocks 24 inches thick and reduce them to slabs six inches thick or less.



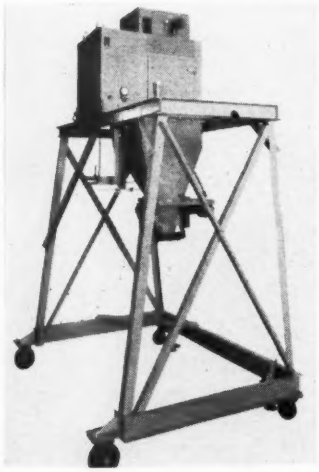
FEMCO's foam cutter for 24-inch slabs

FEMCO's new machine is intended principally for fabricating materials for furniture and automotive cushioning and padding, mattresses and bedding, and clothing, mostly coat-liners. The new 84 by 110 leveler and splitter is fully automatic after the first leveling cuts have been made to give the block uniform thickness.

Dimensions of the new leveler and splitter in the 84 by 110 size are 12 feet 10 inches by 19 feet 8 inches. Weight is 7,000 pounds net. The drive on the table traverse is by one hp., two-speed motor and mechanism; on the blade, three hp., constant-speed motor; on vertical index, ½-hp. motor and transmission; and on the grinder, ½-hp. motor.

The machine is also made in 64 by 96 and 64 by 110 sizes.

Portable High-Speed Bagging Scale



Portable high-speed bagging scale by Richardson Scale Co.

A versatile high-speed bagging scale, Model E-50, is available in floor portable style, from Richardson Scale Co., Clifton, N. J. Mounted on a heavy-duty frame set on casters, the new unit is easily moved to serve many bins on one floor. An additional new feature is the inclusion of an eye-level counter for tallying the number of bags filled.

Fitted with a quickly detachable and changeable bag spout to accommodate 25-, 50-, or 100-pound bags, the scale weighs and fills open-mouth paper or textile bags with fertilizer, feeds, grain, rock products, chemicals, food products, tobacco, and similar materials.

A minimum number of weighing components in a dusttight housing makes the scale simple to operate. This scale readily accommodates gravity or power feed arrangements. A radial feed gate automatically opens and closes by the instantaneous action of an electrically controlled pneumatic valve. For gravity-fed sluggish materials, an agitator can be provided in the inlet chute. Further information is available from the company.

New Dispersion Mixers

The J. H. Day Co., division of The Cleveland Automatic Machine Co., Cincinnati, O., has announced the successful application of its new heavy-duty Day dispersion mixer for the processing of solid propellant fuels. Specially designed to meet the exacting requirements of this type of processing, this new mixer incorporates many unique engineering and construction features. Agitators are of the over lapping type.

More than ample stamina and reserve power assure economical operation with low maintenance costs and fast, dependable mixing, it is said. The 100-gallon working capacity model has a 200-gallon total capacity and is designed for 75-hp. drive. Vacuum seal stuffing boxes prevent product contamination from lubricants and keep the bearings free from abrasives. Further details may be obtained from the company.

This mixer is available in laboratory and production sizes.

"Link-Belt Geared Flexible Couplings." Book 2775. Link-Belt Co., Chicago, Ill. 12 pages. This new booklet, describing the company's complete line of improved geared flexible couplings, details pertinent application and selection data for couplings with maximum bores ranging up to seven inches and ratings from 2½ to 572 horsepower per 100 r.p.m.

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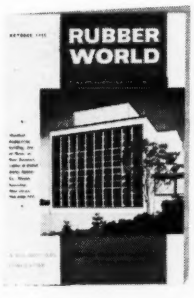

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NEW MATERIALS

Wing-Stay T—Antioxidant

Wing-Stay T, a new non-staining, non-discoloring rubber antioxidant designed to meet the rubber industry's need of a higher activity anti-oxidant, has been developed by the chemical division of The Goodyear Tire & Rubber Co., Akron, O. A hindered phenol, Wing-Stay T provides excellent stability for compounded natural, styrene-butadiene, and nitrile rubbers at 1.25 phr. It forms stable, non-hydrolizable emulsions that successfully check heat, light, and oxygen degradation and discoloration, and it is particularly effective against sunlight aging, it is further claimed.

Laboratory tests revealed excellent window aging properties, and similarly, after aging for 18 days in a 50° C. oxygen bomb under 150 psi. pressure, Wing-Stay T samples showed more than 81% tensile retention; while figures of zero and 26 were obtained for two other antioxidants.

Antioxidant activity of Wing-Stay T is said to be superior to that of any other non-staining antioxidant currently available in the same price range. High activity of the new material suggests its use in white sidewall tires, surgical gloves, rubber flooring, household and drug sundries.

Some typical physical properties of Wing-Stay T appear in the tabulation below:

Density 20/20	0.9 gms/ml
Viscosity-Stormer with 400 Gm wt @ 25° C.	60–150 rpm.
Refractive index, N_D 25	1.496

A technical bulletin on Wing-Stay T is available from the company.

New Niax Triols

A new series of polyol polyethers has been introduced by Union Carbide Chemicals Co., Division of Union Carbide Corp. These polyethers make it possible for urethane manufacturers to prepare a broad range of prepolymers to meet the most exacting requirements for flexible foams. These new intermediates are propylene oxide addition products of 1,2,6-hexanetriol, trade marked Niax. Four polyethers, varying in hydroxyl number from 42 to 240, corresponding to molecular weights from 4,000 to 700, are available.

Niax triols can be used alone or in combination with a polypropylene glycol such as Niax diol PPG-2025. Greater proportions of the triols increase the load-bearing properties and improve the compression-set characteristics of urethane foams. Thus, by increasing the amount of triol in his formulations, a foam manufacturer can produce a range of foams of increasing rigidity.

Expected uses of the new derivatives vary with their molecular weights. Niax triol LHT-42, with molecular weight of 4,000, will probably find its major application in soft foams such as clothing inner-liners; triol LHT-67 (MW-2,500), in furniture and automotive cushioning; triol LHT-112 (MW-1,500), in flexible foam as a cross-linking agent with polyether diols; triol LHT-240, (MW-700) in semi-rigid foams.

The new triols are being sold at prices competitive with other polyethers for urethanes now on the market. Niax triols LHT-42 and LHT-67 are priced in tank-car quantities at 27.5¢ per pound, delivered. Tank-car price for Niax triol LHT-112 is 31.0¢ per pound, and for LHT-240, 36.0¢ per pound; both products are priced on a delivered basis.

RuBars—New Compounding Agent

A new type and form of rubber compounding agent, RuBars, have been made available by The DuBois Co., Inc., Cincinnati, O. RuBars, used in low percentages in mechanical and other mold and extrusion stocks, is reported to bring about a much cleaner and easier mold release while at the same time sharply cutting the consumption of mold spray.

Part of the same action is the keeping of molds much cleaner much longer, with consequent overall improvement of final product finish. Tests have shown no measurable effect on either chemical or physical indices resulting from the use of RuBars in compounding. RuBars is described as blond-pale, usable accordingly in even very light stocks.

The new product is supplied in 2.5-pound units, readily divisible for sizing to formula requirements and packed in clean, rubber-safe lined cartons.

New Dow Corning Adhesive

A new, easily applied high bond strength silicone rubber adhesive, Silastic Adhesive S-2200, has been developed by Dow Corning Corp., Midland, Mich., and is available in pilot-plant quantities. The new material is translucent, non-toxic, contains no solvent, and may be applied with knife or spatula.

Designed to bond vulcanized silicone rubber parts, Silastic S-2200 vulcanizes to create a strong bond in only five minutes at 240 to 270° F. The new adhesive is also recommended for bonding silicone rubber to a variety of common metals. Optimum adhesion to metal, however, requires a cure of about four hours at 480° F. under firm contact pressure. Good adhesion may be obtained with shorter cures through the use of A-4094, a silicone primer which air-dries in 30 minutes.

Some typical properties of Silastic Adhesive S-2200 follow:

Color	translucent
Specific gravity	1.10
Brittle point, F.	−100

A technical data sheet supplying information on properties, usage, and bond strength with various cures is available from the company.

Naugapol K-50, Resin-SBR Masterbatch

Naugapol K-50, a masterbatch of Kralac A-EP (Naugatuck Chemical's easy-processing high styrene resin) and a Naugapol 1503 type of SBR, is made by coprecipitating blended latices, contains 50% Kralac A-EP by weight, and has a specific gravity of 0.99.

Naugapol K-50 is primarily designed for use with additional SBR in the compounding of such products as shoe soles, tile, and wire insulation. The material is given Naugatuck's "special finishing" used to produce low ash-low moisture absorption rubbers for wire insulation compounds and may be described accurately as a "wire grade."

This resin-SBR masterbatch may be blended with other synthetic rubbers and natural rubber to produce a wide variety of products.

Naugapol K-50 is relatively stiff at room temperature, but softens readily during mixing at temperatures of 200 to 225° F. It is preferable to soften this material before blending with additional polymer.

A technical bulletin, No. 217, is available from the Naugatuck Chemical Division of United States Rubber Co., Naugatuck, Conn.

New Antiozonant—Eastozone 32

A third phenylenediamine-type antiozonant, Eastozone 32, is being offered to rubber compounders by Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., New York, N. Y. According to the company, laboratory tests indicate the new antiozonant to be effective in from one to two parts per

(Continued on page 613)

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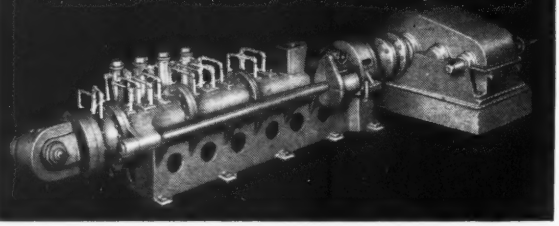

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NEW PRODUCTS

Goodrich Transmission Belt

Belt stretch, a costly problem where transmission belts are used on drives, is reduced to a minimum in a new belt announced by B. F. Goodrich Industrial Products Co., Akron, O. Length uniformity in the new belt, designed for use on all-type drives, is maintained by manufacturing the belt in a room under conditions of controlled humidity.

The new belt is named Unicord because the tension member consists of one ply of super-strength synthetic cord. The single ply is said to have the strength of five plies of the company's No. 50 cord.

Flex life of the Unicord belt is greater than other constructions on small pulleys because there are no plies to separate. The belt gives top performance at all speeds, running straight and smooth.

A loop built belt, the Unicord has folded-edge construction formed by a black two-ply straight-laid wear-resisting envelope cover. The belt is available from four inches to six inches in width and 100 inches to 45 feet in length.

Firestone "Roadbuilder"

A new vibration-free road grader tire has been developed by The Firestone Rubber & Tire Co., Akron, O., for precision road-building work. Designated the "Super Ground Grip Roadbuilder," the new tire eliminates troublesome wave motion which makes precision grading difficult, it is claimed.

The Roadbuilder has a wider, flatter tread and rugged traction bars to give positive gripping action on all types of surfaces. The body is constructed of specially treated nylon cord. This open-center tread tire features better cleaning and smoother operation at all speeds

The nylon cord body of the new tire allows additional retreads. Tests conducted under extreme weather conditions have shown that the tire out-performs previous production tires. Improved tread compounding, combined with extra retread life, makes the tire the best cost-per-hour tire of its type, according to the company. The new tire is available in either the tubeless or tubed construction.

Parker Wingseal Sealing Ring

A new synthetic rubber sealing ring, given the name Wingseal from its cross-section shape, is being offered by The Parker Appliance Co., Cleveland, O., for interchangeable use with AN6290 O-rings on AND10056 fittings in the AND10050 boss.

The new-design Wingseal has been fully evaluated in a two-part test, one using maximum seals in minimum bosses, and the other minimum seals in maximum bosses. Hydraulic impulsing, using OS-45 fluid, was at the rate of 40 cycles per minute. Temperature was 400° F., with operating pressure 3,000 psi., peak pressure 3,600 psi., and rate of rise 175,000 psi. per second. Wingseals in each of the maximum-minimum seal and boss configurations went through 50,000 cycles without any sign of leakage and were still pliable at the end of the test.

Wingseal sizes, from 2 through 32 (used with fittings for tubing from ⅛-inch through two inches outside diameter) are listed on page 11 of revised Catalog 5701, available from the rubber products division of the company.

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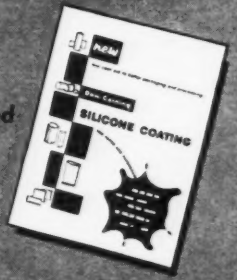

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New Products

Goodyear's Fuel Oil Hose

An improved version of Redwing fuel oil hose has been placed on the market by the Goodyear Tire & Rubber Co., Akron, O. A new tube stock has been compounded that remains flexible in service. Aromatics in fuel oils do not extract the plasticizer from the tube.

Constructed with two or three braids of rayon, the three-braid hose is recommended for reel service. It permits free flow when the hose is reeled up as much as 75%. The new hose cover and tube are designed for flexible service at temperatures 40 degrees below zero.

This hose is manufactured in sizes from one inch to an inch and a half; maximum working pressures range from 150 pounds for the two braid type to 200 pounds for the three-braid.

StyleLiner Car Mat

A deluxe mat for continuous one-piece coverage of front automobile floors has been developed for national distribution by The Wooster Rubber Co., Wooster, O., maker of the Rubbermaid Kar-Rug and Stylemaster lines. The StyleLiner was developed not only to protect carpeting underfoot, but to cover the floor slope and transmission hump as well. Its heavy-duty construction promises long, durable service and comfortable cushioning. A special underside design holds the mat firmly in place.

The StyleLiner will be available in seven colors: blue, green, grey, red, white, brown, and black.

Standard End Face Seals

A new line of end face seals in standard sizes is now being offered by Chicago Rawhide Mfg. Co., Chicago, Ill. Pre-engineered to meet the widest possible range of sealing requirements, the new C/R standard end face seals are available in two complete series, long and short. Specifications include ¾- to 4-inch shaft sizes; pressures to 500 psi.; temperatures to 500° F.; and peripheral speeds to 15,000 fpm. For special sizes and conditions other than those for which standard end face seals were designed, C/R will continue to develop new seals or to recommend existing designs.

Complete space envelope data on the new C/R standard end face seals are presented in Bulletin EF-100 to permit size selection for incorporation in equipment designs. The information includes a size range table for both the long and short series; and a size range table for standard mating rings. Typical seal installations for internal and external applied pressures and diagrams showing construction of seals and mating rings are given. Free copies of the bulletin are available from the company.

Wire Braided Steam Hose

The availability of a wire-braided steam hose for high-pressure, high-temperature service has been announced by Acme-Hamilton Rubber Mfg. Corp., Trenton, N. J. Known as Gibraltar steam hose, it is recommended for saturated steam pressures up to 200 psi. or for handling super-heated steam up to 385° F.

This hose is constructed with the highest quality heat-resisting rubber tube and features two braided plies of high-tensile reinforcing wire. These reinforcing wires guard against hose rupture or bursting during operation. A heat, oil, and abrasion resisting neoprene cover is inseparably bonded to the wire carcass by a ply of high-tensile, heat-resisting cord yarn.

Used for steam handling and steam jenny service, the hose is available in sizes from ½-inch I.D. to 2½-inch I.D. These sizes weigh from 62 to 230 pounds per 100 feet.

New Products

Rubber Heating Blanket

Fast and efficient defrosting of home refrigerators and freezers is promised by a new, flexible heating blanket developed by United States Rubber Co., New York, N. Y., for the refrigeration and food industries. The blanket, called Uskon type "O," uses electrically conductive rubber for a heat source instead of hot wires. This makes the blanket so flexible that it can be bent around corners and still produce even heat over its entire surface.

The type "O" blanket is made from a rubber-plastic compound that is odor-free when hot, can be easily cleaned, and has good service-life expectancy when the blanket is operated up to 250° F., according to the manufacturer. The blanket is made to operate on either 115 or 230 volts, and wattage can be varied to meet customer needs. The maximum operating temperature, 250° F., of this blanket can be reached in as little as three seconds or as long as 15 minutes. It can be thermostatically controlled, and its expected service life ranges up to 50,000 hours.

The outer surface of the blanket is compounded from vinyl plastic and Paracril synthetic rubber, making it highly resistant to oils and also easy to clean. The blanket is hermetically sealed and may be operated when wet or even under water.

It can be made small enough to fit in the palm of a hand or large enough to cover a long counter. Thicknesses vary from $\frac{3}{32}$- to $\frac{5}{32}$-inch, and weights from eight to 16 ounces a square foot. Stock blankets are grey in color and have a fabric-like finish. Other colors can be made on order.

Neoprene Closure Strips

A new line of closed cellular neoprene closure strips which provide permanent weatherproofing for corrugated roofing and siding has been introduced by the Rubatex Division of Great American Industries, Inc., Bedford, Va.

The new stripping, which is said to be very easily installed, insures an airproof, waterproof, and dustproof seal. It can be used with metal, asbestos, glass, or plastic construction materials.

The stripping can be installed with flashing sections at roof junctions, side walls, and end walls and at window and door openings. It can also be used under the aprons of ridge roll and under siding at foundation level.

Rubatex Division die-cuts the neoprene closure strips to order to fit specifications of the corrugated material used. Separate caulking operations are not required because the stripping is fastened simultaneously with the corrugated sheeting.

New Antiozonant

(Continued from page 608)

hundred of rubber. This amount is from ½ to ⅓ that required of other commercially available antiozonants.

Identified as N,N'dimethyl-N,N'-di-(1-methylpropyl)-p-phenylene-diamine, Eastozone 32 is higher in its per pound price than other antiozonants. It is claimed, however, that its effectiveness in lower concentrations will result in lower overall cost for equal ozone protection.

Some typical physical properties are as follows:

Appearance	reddish brown liquid
Refractive index $n_D^{80°F.}$	1.5320
Specific gravity, 80° F.	0.933
Viscosity, Saybolt universal, at 100° F.	52 secs.
Flash point, Cleveland open cup	333° F.
Solubility in	
Sodium hydroxide (10%)	insoluble
Benzene	miscible
Ethyl alcohol	miscible
Water	pH 12—slightly soluble pH 3 to pH 10—soluble

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TECHNICAL BOOKS

BOOK REVIEWS

"Chemistry of Natural and Synthetic Rubbers." By Harry L. Fisher. Hard cover, 6 5/16 x 9 5/16 inches, 214 pages. Reinhold Publishing Corp., New York 22, N. Y. Price $6.50.

This is a brief, but excellent book by a pioneer rubber chemist.

The history of one's profession is always interesting and at times may be a source of inspiration. Dr. Fisher gives his readers, not only in the introductory chapter (Elastomers: History and Chemistry), but at appropriate places throughout this book much very interesting "rubber history." For example, how many rubber technologists realize that synthetic rubber tires were exhibited as early as 1912 at the Eighth International Congress of Applied Chemistry? Was Sir Henry Wickham a smuggler and a thief? Did he, in fact, steal the rubber plantation industry from the Government of Brazil? Not true, asserts our historian-rubber chemist. Records show the deal was entirely legal!

The extent of the purely technical portion of the book is suggested by the following chapter headings: Vulcanization, Acceleration, Antioxidation and Antiozonation, Natural Rubber, Latex, Properties of Natural and Synthetic Rubbers, Synthetic Rubbers, Hard Rubber, Bonding Rubber to Metal, Reclaimed Rubber, and Chemical Derivatives.

This is for the most part a book of facts with little sophisticated theory. Some recent work on the mechanism of sulfur vulcanization is described, however, and from this it is concluded that sulfur does not add chemically to a double bond, but is chiefly in the thio-ether linkage and on the alpha-methylene carbon. Vulcanization without elemental sulfur is discussed, and the mechanism of the various reactions, as far as they are known, is given.

A possible free radical mechanism is suggested as an explanation for the attack of rubber by oxygen. Antioxidants are represented as functioning as chain-terminating agents. Several types of antioxidants and antiozonants, such as N,N'-dialkyl-1,4-phenylene diamines, are listed.

Synthetic rubbers, including the new "synthetic natural" rubbers (Ameripol SN and Coral Rubber) are discussed in regard to their chemical synthesis, structure, properties, and raw material requirements. An unusual polymer described here is AXF synthetic rubber, a reaction product of benzene and ethylene dichloride.

The book concludes with a chapter on the chemical derivatives of natural and synthetic rubbers. Important reactions discussed are cyclization of rubber, hydrogenation, and chlorination.

This book is particularly recommended to the beginning rubber technologist or rubber chemist. It should also prove particularly useful to those persons connected with the rubber industry who are not chemists, but who must, in the course of their work, deal with chemists and chemical engineers.

"Conductive Rubber—Its Production, Application, and Test Methods." By R. H. Norman. Cloth cover, 7½ x 9⅞ inches, 102 pages. Maclaren & Sons, Ltd., London, England. Price, 16 shillings.

This is the first of four technical manuals produced by staff members of the Research Association of British Rubber Manufacturers at Shawbury.

This book is concerned with both the conductive and antistatic classes of rubber compounds. Chapter headings include: Contact Resistance—Manufacture—Effects of Stress, Time, and Other Variables on Resistivity—Test Methods—Variability of Resistivity—and Uses of Conductive Rubber.

The main difficulty in obtaining reliable resistivity data on conductive rubber compounds is the elimination of electrode contact resistance. Experimental results show that contact resistance for a number of types of electrodes varies at the 1.5 power of the resistivity of the rubber vulcanizate. This implies that the error due to contact resistance is a greater proportion of the measured resistance of high resistivity vulcanizates than of the more conductive ones. This fact was not appreciated by some of the early investigators in this area, and the researcher must pay special attention to experimental details when examining the early literature.

Chapter 3, Manufacture, develops some guides to aid the rubber technologist in compounding conductive rubber stocks. In general, structure blacks tend to form harder and more conductive vulcanizates than do other blacks. Prolonged mixing and remilling tend to increase resistivity; while increased mastication of the rubber before addition of carbon black decreases resistivity. In the case of normally accelerated compounds, the change of resistivity with state of cure is usually completed well before optimum vulcanization is reached.

Theoretical bases for the above observations are developed in Chapter 4—Effects of Stress, Time, and Other Variables on Resistivity. The most obvious factors influencing resistivity are carbon black particle size, extent of carbon structure (carbon-carbon bonds are principally responsible for conductivity), and the chemical character of the carbon black surface.

Test methods discussed in Chapter 5 are essentially those of the British Standards Institution, 1953 a, b.

Generally speaking, the major uses of conductive rubbers are for the dissipation of static charges and as heating elements. The book closes with a discussion of these and other less well-known applications (e.g., high-frequency resistors and phonograph pick-up units).

This book presents in a convenient package a large amount of information about a little known phase of rubber technology. It should be a useful reference work.

NEW PUBLICATIONS

"St. Joe Zinc Oxides." The St. Joseph Lead Co., New York, N. Y. 48 pages. This fully illustrated booklet describes the production of the company's zinc oxides and provides a technical manual on their applications in the rubber, paint, ceramic, and other chemical industries. The technical data section covers the general properties of zinc oxides and then employs text, tables, and microphotographs to present the chemical and physical characteristics of the various grades for different applications. A section on zinc oxides in rubber compounds covers such subjects as activation, reinforcement, effects of trace elements, low heat generation, fast-curing types, slow-curing types, surface-treated types, and latex grades of zinc oxides. Subsequent pages treat paint and ceramic applications in a similar manner. A description section explains the company's production of zinc oxides.

"Physical Properties." Union Carbide Chemicals Co., Division of Union Carbide Corp., New York, N. Y. 28 pages. This new 1958 booklet, a guide to the company's products and services, presents the latest property data on more than 350 organic chemicals. An alphabetical index is included. Fifty new chemicals introduced by Carbide since the previous edition are featured. For easy reference, other chemicals are arranged by related chemical groups with condensed application data.

"Thiokol Rigithane 112 Resin." Thiokol Chemical Corp., Trenton, N. J. 4 pages. This data sheet describes the physical and chemical properties, the product specifications, processing, and suggested uses of Rigithane 112 resin, a versatile resin for the manufacture of rigid and semi-rigid urethane foams. This resin may be foamed-in-place to produce a lightweight cellular material adaptable for a wide range of applications and can be cured at room temperature.

"Synpol 1708." Bulletin No. 1. Texas-U. S. Chemical Co., New York, N. Y. 9 pages. First of a series of technical bulletins from TEXUS, this one contains complete data on new improved Synpol 1708, an exceptionally stable, light-colored, cold, oil-extended SBR polymer. It has been developed by the use of a new non-staining antioxidant and a new non-volatile light-colored naphthenic oil. Some typical applications, of which recipes are given in the bulletin, include: molded shoe soling, wire insulation and jacket stocks, gaskets, hose and packing, wringer rolls, proofed fabrics, floor tile, and molded and extruded goods.

"Richardson GA-17 Gross Bagging Scale." Richardson Scale Co., Clifton, N. J. 2 pages. This product data sheet describes the company's high-speed gross bagging scale with automatic or semi-automatic delivery. This sheet also specifies that pellets of many materials can be handled by the scale. Installation dimensions are given as well as bagging specifications. Illustrations include a photograph and an engineering drawing.

"Dow Corning Silicones." Dow Corning Corp., Midland, Mich. 16 pages. This 1958 reference guide, one of the largest and most complete silicone catalogs, describes more than 150 commercially available silicone products, including many introduced within this past year. This catalog contains detailed charts, tables, graphs, and data on properties and performance, along with illustrated examples on how silicones can cut costs, simplify design, and add new sales appeal to products in every field of application.

"Shell Synthetic Rubber." Shell Chemical Corp., Torrance, Calif. 12 pages. This photographically illustrated technical bulletin supplies general descriptions, principal applications, and property specifications of more than 20 different types of the company's SBR synthetic rubber and latex. Included are hot rubber, non-pigmented and black masterbatch; cold rubber, non-pigmented, black masterbatch, oil masterbatch, oil-black masterbatch; and latices, hot latex and cold latex as well as standard test recipes.

"Silent Hoist Lift-O-Krane." Silent Hoist & Crane Co., Inc., Brooklyn, N. Y. No. 91. 4 pages. This bulletin illustrates and gives data on the company's mobile cranes, in particular, the Lift-O-Krane, a one-man system for handling, shipping, and storing bulk materials in collapsible polyethylene or similar containers. The capacities of the cranes are in eight sizes: 3, 5, 6, 7½, 8, 10, 12, and 15 tons.

"Product Research and Development." The Franklin Institute, Philadelphia, Pa. 20 pages. This brochure, published by the Franklin Institute Laboratories, describes the services offered by the Laboratories in this field and lists specific areas in which the Laboratories are staffed and equipped to perform research and development, including polymers and colloids. Projects already completed, or under way, are mentioned to illustrate the extent of Laboratory services. Copies of the booklet are available without charge to those who write, on company letterhead, to the Institute.

"Cyclone, Hi-Spin Dust & Products Collectors." Sprout-Waldron & Co., Inc., Muncy, Pa. 4 pages. This descriptive bulletin gives engineering drawings, complete dimensional tables and full design details of the company's cyclone, Hi-Spin dust, and products collectors. These units are designed for all applications where air is used to handle material, whether it be for feed, foods, chemicals, pharmaceuticals, insecticides or a wide variety of toxic, hazardous, light, and heavy materials.

"Picco Resins." Pennsylvania Industrial Chemical Corp., Clairton, Pa. 12 pages. This brochure gives complete property data on the company's coumarone-indene resins, modified styrene resins, and plasticizers. Picco resins, available in soft, hard, medium, rubber, and modified styrene grades, are fully synthesized compounds produced by polymerization of unsaturates occurring in coal-tar, light oil, and petroleum distillate fractions. Featured in the bulletin are charts showing physical and chemical data, melt viscosities, compatibilities, and solubilities.

THE CARTER BELL MFG. CO. SINCE CARTER BELL PRODUCTS 1903 SPRINGFIELD, NEW JERSEY

Vulcanized

VEGETABLE OILS

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Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods— be they Synthetic, Natural or Reclaimed.

A long established and proven product.

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Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Chicago, Los Angeles, Trenton, Albertville, (Ala.), Denver

Technical Books

Publications of Harwick Standard Chemical Co., Akron, O.:

"HSC #39 Oil." Bulletin #06-42-3-11-57. 3 pages. This revised bulletin gives the chemical composition and uses, the specification and physical properties, the recommended mixing procedure, comparative and physical data of HSC #39 oil, a light-amber, non-staining liquid which is a complex organic compound said to be effective in natural rubber, SBR, neoprene, and acrylonitrile rubbers, particularly where these rubber hydrocarbons are used in combination with high styrene resins.

"Polycizers 162 (DOP), 332 (DOA), 532 (ODA), 562 (ODP), 632 (DDA), 662 (DDP)." Bulletin #07-75-3-10-57. 4 pages. This recently revised bulletin gives detailed properties and performances of the company's plasticizers, designated Polycizers, for use as modifying agents in polyvinyl chloride resins. The flexibility or hardness of the plastic is controlled primarily by the concentration of plasticizer in the recipe.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.:

"Improved Tensile Strength of Films from Neoprene Latex Type 750." Report BL-333. R. C. Scott. 4 pages. This bulletin gives information on how the tensile strength of dipped films from Latex Type 750 may be increased by compounding with small amounts of lignin. Formulation tables, physical properties, and compound stability data are included.

"Applications of Hypalon Coatings to Cellular Products." Report BL-332. D. J. Kelly and K. C. Smith. 6 pages. This pamphlet describes applications of Hypalon coatings which are said to be very resistant to weather, chemicals, and many deteriorating influences. These coatings may be colored as desired and will retain their color upon exposure to sunlight and outdoor conditions. The coatings are applicable to cellular products, especially urethane foams.

"Du Pont Elastomers and Chemicals." A-5737. 75 pages. This booklet gives the chemical composition, physical properties, use, and processing of the products sold by Du Pont's elastomer chemicals department, such as Hypalon, neoprene, and neoprene latex, and chemicals such as rubber accelerators, rubber antioxidants, blowing agents, rubber latex stabilizers and mold lubricants, rubber peptizing and reclaiming agents, rubber dispersed colors, special-purpose chemicals, and Hylene organic isocyanates. Health hazards and development products are included. This publication, a fifth edition of the company's book, is successor to one issued in August, 1950.

"Specifications and Characteristics of Fatty Acids." Emery Industries, Inc., Cincinnati, O. 4 pages. This booklet covers the company's complete line of fatty acids, including Emersol stearic and oleic acids, Hyfac hydrogenated fatty acids and glycerides, Emery animal and vegetable fatty acids, and Hyfac castor-oil derivatives. The brochure also contains a list of the current technical literature offered by Emery. A free copy is available from the company.

"Resins for the Rubber Industry." Schenectady Resins Division, Schenectady Varnish Co., Inc., Schenectady, New York. 32 pages. This technical manual considers the company's resins both for rubber compounding and for adhesives. For rubber compounding, it lists general data, compounding techniques, uses, applications chart, and product data. For resins for adhesives, the booklet lists general data, compounding techniques, uses, applications chart, product data, and concludes with ordering instructions.

"Wall Chart of Conversion Factors." Precision Equipment Co., Chicago, Ill. 1 page. This reference table for engineers and executives includes common conversions such as inches to centimeters or watts to h.p. as well as many conversions that are difficult to find in reference manuals. Some examples are atmospheres to kgs/sq. cm., cm/sec. to miles/hr., cu. ft. to liters, microns to meters, quintal to lbs., etc. The chart is available without charge from the company.

"Cycolac Product News." Marbon Chemical, Division of Borg-Warner, Gary, Ind. These bulletins are designed to acquaint the trade with a background of information on the molding, extruding, and calendering of Cycolac thermoplastic resin for various end-use products. Each bulletin is illustrated with pictures, charts, and graphs and contains information which should prove valuable to molders, extruders, calenderers, and end-use fabricators.

"Chlorowax 70 in Neoprene Compounds." Diamond Alkali Co., Cleveland, O. 3 pages. This technical bulletin covers the use of Chlorowax 70 as a plasticizing and reinforcing resin in neoprene compounds. Four major advantages provided by this resinous chlorinated paraffin, when used with Type W and Type GN neoprene compounds, are summarized, and its principal applications listed. Data presented also include a formula and physical properties table, which gives cures from 10 to 30 minutes, complete with ratings of 300 to 500% modulus, tensile at break, elongation at break, cresent tear, and Shore A hardness for each cure.

"Paracril Nitrile Rubbers. Standard Grades—Characteristics and Compounding." W. E. Galwardy. Naugatuck Chemical Division of United States Rubber Co., Naugatuck, Conn. 32 pages. This revised Paracril bulletin contains much new information on the company's Paracrils, oil-resistant chemical rubbers produced by the copolymerization of butadiene and acrylonitrile. This information includes general description, processing, basic compounding, compounding Paracril for specific properties, Paracril cements, and recommended uses of Paracril. It is suggested that the original Paracril Bulletin No. 1 be replaced by this revision.

"Indulin." West Virginia Pulp & Paper Co., polychemicals division, Charleston, S. C. 20 pages. This new technical bulletin provides latest authoritative data on Indulin, unique surfactant, extender, dispersant, reinforcent, binder, sequestering agent, emulsifier, emulsion stabilizer, and protective colloid. Fully described are Indulin's usage as a stabilizer for asphalt emulsions, removal and recovery agent for proteins, resin extender, rubber reinforcing agent, storage-battery plate expander, and retarding agent for vat and sulfur dyes. Illustrations, tables, charts, and properties are included.

"Methallyl Alcohol." Food Machinery & Chemical Corp., New York, N. Y. 5 pages. This comprehensive technical bulletin, available from the FMC organic chemical division, gives the physical properties, specifications, uses, and chemical properties of methallyl alcohol. This alcohol is a reactive intermediate for the preparation of methallyl derivatives as well as being a monomer in polymerization reactions, where it may be of interest in the preparation of adhesives, protective coatings, safety glass liners, and specialty rubbers.

Butyl Rubber Compounds

(*Continued from page 567*)

of the compounds. After the proper ratio of the proper mineral fillers has been determined, much higher total loadings are possible while excellent processibility characteristics for the compounds are still retained.

The types and amounts of processing aids used can be determined only by the total mineral-filler loadings, the types of mineral fillers, ratios of mineral fillers, the type of butyl rubber polymers used, and the specifications for the end-product. Combinations of silicate-type pigments and clays in butyl rubber stocks compounded with certain combinations of processing aids produce butyl rubber stocks having very good physical properties which can be easily processed.

SO FREQUENTLY

. . . vital improvements in rubber goods' physical properties, color, or compounding costs result from experimentation with one or more of our Columbia-Southern white reinforcing pigments.

Hi-Sil,® Calcene,® and Silene® provide uniquely unlimited avenues for compounding to precise properties. GR-S, butyl, neoprene, nitrile . . . many stocks can be materially upgraded, and usually at *lower* volume cost than with less versatile reinforcers.

Do you have sufficient working samples of these three pigments on your shelf? Just use the coupon today . . . at no obligation, of course.

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MARKET REVIEWS

Latex

During the last half of November the market for latex in drums was quiet, but toward mid-December some fairly widespread enquiries came from manufacturers for shipment during the first half of next year. This state of affairs seems to indicate that the present price level is attractive from a consumer's point of view and may lead to an expansion of interest generally.

At the same time, while producers appear willing to meet buyers for nearby shipment, they show more reluctance in contracting forward sales at these levels, and business on the whole has been only moderate. The market for bulk latex is still very steady, and the outlook appears reasonably sound.

The Malayan production of latex in October amounted to 10,171 tons, compared with 8,801 tons in September, and is the highest monthly production since December, 1955, when 10,165 tons were produced.

The U.S.A. October consumption of natural latex is reported at 7,216 tons, against 6,683 tons in September. United States stocks at the end of October totaled 12,346 tons, compared with 12,212 tons on September 30.

Prices for ASTM Centrifuged Concentrated natural latex, in tank-car quantities, f.o.b., rail tank cars, ran about 35.49¢ per pound solids. Synthetic latices were 22.5 to 31.2¢ for SBR; 37 to 55¢ for neoprene; and 46 to 65¢ a pound for nitrile types.

Final September and preliminary October domestic statistics for all latices were reported by the United States Department of Commerce as given below:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
Sept.	0	6,834	6,645	12,315
Oct.	0	—	7,216	12,346
SBR				
Sept.	5,649	—	5,676	7,566
Oct.	6,876	—	6,416	7,506
Neoprene				
Sept.	917	0	712	1,141
Oct.	885	0	794	1,057
Nitrile				
Sept.	1,285	0	753	1,700
Oct.	1,133	0	685	1,333

Synthetic Rubber

Production of synthetic rubber in November reached 105,960 long tons, the second highest month on record and only slightly below the all-time high reached in October, 1957, when 106,401 long tons of synthetic rubber were produced, according to the monthly report of the RMA.

Consumption of total new rubber in the United States was 118,000 tons in November, as compared with 137,058 in October, owing probably to cutbacks in automotive production and some slackening of overall business activity. Consumption of synthetic rubber was down 13,747 tons, and natural rubber was down 5,311 tons in November.

Rubber consumption in the first quarter of 1958 is expected to equal that of the last quarter of 1957, which, with the near record October figure, should mean the use of a satisfying tonnage. It is considered that inventory replacement in the industry of rubber and tires for replacement use will help counteract the possible reduced consumption of rubber and tires for original-equipment use.

Consumption of synthetic rubber in November actually amounted to 74,689 tons, against 88,436 tons in October; while natural rubber consumption was 43,311 tons, against 48,622 tons on the same basis. The ratio of synthetic rubber to total new rubber during November was 63.3% as compared with the 64.5% in October.

Consumption of synthetic rubber by types in November, as compared with October usage, was as follows: SBR, 62,171, against 73,479 tons; neoprene, 6,071, against 7,211 tons; butyl, 4,447, against 5,365; and nitrile, 2,000 against 2,381 tons.

Production of synthetic rubber by types in November, as compared with October output, amounted to: SBR, 87,100, against 87,709 tons; neoprene, 9,976, against 9,545 tons; butyl, 6,099, against 6,085; and nitrile 2,785, against 3,062 tons.

Exports of synthetic rubber in November were about equal to those of October at 15,572, against 15,640 tons. Exports of SBR amounted to 12,000 tons in both months; neoprene rose to 2,550 from 1,900 tons; butyl declined to 647 from 1,260 tons; and nitrile dropped to 375 from 480 tons.

Natural Rubber

During the November 16-December 15 period events in Indonesia prompted increased rubber futures market activity and resulted in profit taking at high price levels and short covering. While dealer buying was largely improved, consumer interest was still lacking from the local scene. Fear that supplies would be cut off from Indonesia did, however, lead to increased dealer buying in physicals.

It was reported that rubber company officials in America expect so far that the flow of natural rubber will be disrupted little by the political trouble in Indonesia. They based their reasoning on two main factors:

Over the long run, Indonesia would be compelled to keep export volume going in rubber, which is the republic's No. 1 export.

The island of Sumatra, which turns out some two-thirds of Indonesia's rubber output, has been maintaining a semi-independence of the Sukarno regime.

Reports of cancellations in ships scheduled for Indonesian ports were refuted, or minimized, by a check with shipping companies here, suggesting that cargo space would be available in sufficient quantities to meet nearby obligations.

Heavy buying by Russia and the Chinese Republic is believed to have made Malaya's rubber export figures for October the highest this year. Statistics issued by the government show that Malaya exported 63,615 tons of rubber in October, compared with a previous high in September of 54,178 tons.

November sales, on the New York Commodity Exchange, amounted to 13,260 tons, compared with 14,770 tons for October; none on the Rubber-Standard Contract. There were 18 trading days in November; 19 during the November 16-December 15 period.

Rex Contract

	Nov. 22	Nov. 29	Dec. 6	Dec. 13
Nov.	27.50	....	....	....
1958				
Jan.	27.80	27.70	29.30	29.80
Mar.	27.90	27.77	29.20	29.58
May	27.95	27.80	29.05	29.40
July	27.95	27.80	29.05	29.25
Sept	27.95	27.87	29.00	29.15
Nov.	27.95	27.85	28.95	29.05
1959				
Jan.	....	27.85	28.90	29.00
Total weekly sales, tons	4,370	2,000	4,550	9,560

On the physical market, RSS #1, according to the Rubber Trade Association of New York, Inc., averaged 27.36¢ per pound for the November 16-December 15 period. Average November sellers' prices for representative grades were: RSS #3, 26.35¢; #3 Amber Blankets, 24.71¢; and Flat Bark, 21.30¢.

CYANAMID RUBBER Chem Lines

NO. 14 OF A SERIES Published by AMERICAN CYANAMID COMPANY, Rubber Chemicals Department, Bound Brook, New Jersey

Pepton® 22 Plasticizer for Black Extended and Oil Extended SBR Masterbatches

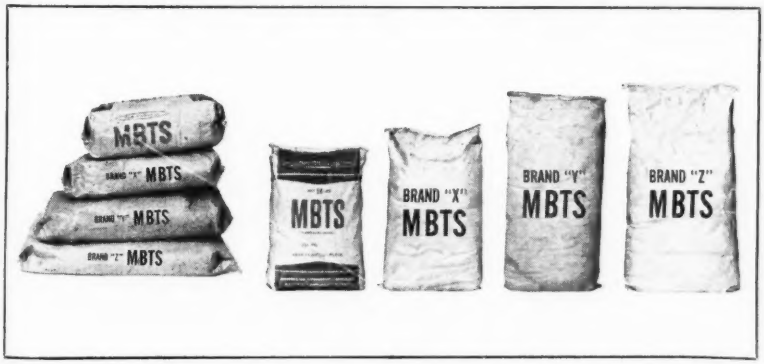
Pepton 22 has been shown to be effective in oil-extended SBR. Since its effectiveness is not diminished in the presence of furnace blacks, the possibilities of its use as a plasticizer in the black masterbatches of oil-extended SBR looked promising. A series of Banbury mastication tests were undertaken with such a masterbatch represented by SBR 1801. Conditions were designed to give a dump temperature approximating that encountered in factory processing. The results shown below are averages of the values obtained by duplicate runs on each mixture:

	Midget Banbury Jacket at 314°F, Rotors at 212°F		
Comp. No. 119	M207	M208	M209
SBR-1801 (gm)	300	300	300
Pepton 22 (gm)	0	1.0	2.0
(% on SBR hydrocarbon)	(0)	(0.58)	(1.17)
Mastication time (min.)	10	10	10
Dump temperature	345°F	345°F	345°F
Mooney Viscosity after mastication ML-4 at 212°F	104+	75+	65+

The Mooney Viscosity values clearly show the plasticizing effect of Pepton 22.

Trouble is sometimes encountered in the factory when furnace black is mixed with oil-extended SBR in a tread stock formula. The stock has a tendency to crumble when dropped from the Banbury to the sheet-off mill. Further tests were therefore carried out to determine the value of Pepton 22 in this application. A direct mix, with the plasticizing operation accomplished in the early stages of the mix, was studied with conditions designed to give a dump temperature of 340-350°F. Results indicated that 0.5 to 1.0% of Pepton 22 *on the polymer* had a satisfactory plasticizing effect and eliminated the crumbling tendencies. The plasticizing action may be increased, if desired, by using higher ratios of Pepton 22.

Vacuum-Packed Bags Save 20% Storage Space



Vacuum packing is a recent service installed for the convenience of Cyanamid's MBTS customers. As these comparison photographs clearly show, this method of packing permits the use of a much smaller bag for the same weight of MBTS. Warehouse or storage space is reduced by as much as 20%.

MBTS Pellets

Comments frequently heard concerning the use of accelerators in powdered form are as follows:

The powder is too difficult to handle; it sticks to the scoop; it is dusty when poured; at times there is a definite material loss on weighing.

The fine texture of the powder may cause further material loss through Banbury venting systems or around loose packings. Increased costs and poor working conditions result.

Other rubber chemical manufacturers have made formed types of MBTS to eliminate these complaints. These formed materials have been moderately successful in overcoming the dust and handling problems of the powdered material. However, in most cases poor dispersion characteristics have offset the advantages gained by the use of the formed products.

Cyanamid's MBTS PELLETS are the answer to this challenge. The dustless form of the MBTS PELLETS eliminates handling problems and insures that there is no loss of material in weighing and use. The easy flow characteristics are noticeable from the above picture.

Laboratory tests and plant trial tests have indicated that Cyanamid's MBTS PELLETS have excellent dispersion characteristics and can be easily incorporated in the rubber stock during mill or Banbury mastication. Samples of Cyanamid's MBTS PELLETS can be obtained from your American Cyanamid Rubber Chemicals representative.

	Nov. 22	Nov. 29	Dec. 6	Dec. 13
RSS #1	27.63	27.63	29.00	29.50
2	27.00	27.13	28.50	28.75
3	26.50	26.50	27.88	28.00
Pale Crepe				
#1 Thick	30.00	30.00	32.00	31.50
Thin	30.00	30.00	32.00	31.50
#3 Amber				
Blankets	25.25	25.25	26.50	27.25
Thin Brown Crepe	24.25	24.25	25.50	26.13
Standard Flat Bark	21.63	21.63	22.25	22.50

Scrap Rubber

There were few new developments in the scrap rubber market during the November 16-December 15 period. Suppliers continued to work on filling mixed auto-tire orders for December shipment to Naugatuck, and tires were also being shipped to Buffalo. Mixed tires ranged from $8 to $11 in the East, with the high side of the range applicable only on shipments to Buffalo. Trading in scrap tubes generally was described as steady.

	Eastern Points Per Net Ton	Akron, O.
Mixed auto tires	$8.00-$11.0	$12.00
S. A. G. truck tires	Nom.	15.50
Peeling, No. 1	Nom.	23.00
2	Nom.	20.00
3	Nom.	15.50
Tire buffings	Nom.	Nom.
	(¢ per Lb.)	
Auto tubes mixed	2.75	2.75
Black	6.25	6.25
Red	6.50	7.00
Butyl	3.50	3.75

Reclaimed Rubber

The period between mid-November and mid-December revealed that reclaimed consumption was lower than had been expected, and demand continues to show signs of slowing down. The automotive industry was apparently more cautious than estimated and car sales did not materialize at the highest level. Sales in the next four-week period are not expected to increase markedly.

According to The Rubber Manufacturers Association, Inc., report, November production of reclaimed rubber reached 22,100 tons; while consumption was 21,500 long tons. During the 11-month period ending in November, domestic production totaled 251,347 tons; consumption, 249,732 tons.

RECLAIMED RUBBER PRICES

Whole tire, first line	$0.11
Third line	.1025
Inner tube: black	.16
Red	.21
Butyl	.14
Light carcass	.22
Mechanical, light-colored, medium gravity	$0.155
Black, medium gravity	.085

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer producer a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity, at special prices.

Industrial Fabrics

A modest pick-up has developed in some wide industrial fabrics recently, but this has not been so substantial as mills and selling houses had been hoping for about this time. Most of the buying of wide industrial goods has taken place in wide sheetings and drills, with little interest shown in broken twills or wide sateens in the last few weeks by plastic coaters or auto manufacturers.

Despite the modest volume of current trading, which for the most part is confined to orders for nearby delivery, a firmer, more confident tone is evident in this market. This is partly attributed to the fact that clean and good-quality cotton in required staple is due to become increasingly scarce, and this scarcity, in turn, is expected to result in a tighter supply of good-quality industrial fabrics.

To date prices of wide industrial fabrics—as drills, sateens, broken twills, and sheetings—have not advanced, but the price hikes in many other cotton textiles—such as yarns, print cloths, cotton ducks, and finished goods—have served to trim wide fabrics. With just a little pickup in demand, wide industrial fabric prices are likely to move up 1¢ to 2¢ a yard, trade sources believe.

INDUSTRIAL FABRICS

Drills		
59-inch 1.85 yd.	*yd.*	$0.335/.34
2.25-yd.		.285/.29
Ducks		
38-inch 1.78-yd. S.F.	*yd.*	nom.
2.00-yd. D.F.		.30
51.5-inch, 1.35-yd. S.F.	*yd.*	
Hose and belting		.63
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.2275
3.65-yd.		.1525
Raincoat Fabrics		
Printcloth, 38½-in., 64-60, 5.35-yd.	*yd.*	.1325
6.25-yd.		.1165
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.2275
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	*yd.*	.73
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-in., 1.65-yd., 2-ply	*yd.*	.41
64-inch, 1.25-yd., 2-ply		.59
Sateens, 58-inch, 1.32-yd.		.52/.525
58-inch, 1.21-yd.		.5675

Rayon

Total packaged production of rayon and acetate filament yarn during November was 58,300,000 pounds, consisting of 26,600,000 pounds of high-tenacity rayon yarn and 31,700,000 pounds of regular-tenacity rayon yarn. October production had been: total, 59,400,000 pounds, including regular-tenacity yarn, 33,500,000 pounds, and high-tenacity rayon yarn, 25,900,000.

Filament yarn shipments to domestic consumers totaled 56,700,000 pounds, of which 25,200,000 pounds were high-tenacity rayon yarn, and 31,500,000 pounds were regular-tenacity rayon yarn. October shipments had been: total 57,700,000 pounds; high-tenacity, 24,200,000 pounds; regular-tenacity, 33,500,000 pounds.

Stocks on November 30 reached 70,100,000 pounds, made up of 16,700,000 pounds of high-tenacity rayon yarn and 53,400,000 pounds of regular-tenacity rayon yarn. End-of-October stocks had been: total, 69,700,000 pounds; high-tenacity rayon yarn, 16,200,000 pounds; regular-tenacity, 53,500,000 pounds.

There were no reported price changes recently.

RAYON PRICES

Tire Fabrics	
1100/490/2	$0.69 /$0.73
1650/908/2	.63 / .725
2200/980/2	.625/ .655
Tire Yarns	
High-Tenacity	
1100/ 490, 980	.50/ .64
1100/ 490	.59/ .63
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .65
1230/ 490	.59/ .63
1650/ 720	.55/ .58
1650/ 980	.55/ .58
1875/ 980	.55/ .58
2200/ 960	.54/ .57
2200/ 980	.54/ .57
2200/1466	.64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.58
1900/ 720	.58

Letters to the Editor

(*Continued from page 492*)

DEAR SIR:

You ask whether we like Scored Pages. Journals of comparatively little importance to us are, after circulation, thrown away, when any articles that might be worth filing have first been torn out for keeping. In such cases, scored pages would be very welcome.

However, as we consider RUBBER WORLD valuable enough to keep entirely and even to be bound annually, we think the scoring is superfluous. And we are by no means sure what our bookbinders will say when they discover the pages scored already.

E. H. MAAS, Librarian
John Bull Rubber Co., Ltd.,
Leicester, England.

The start of the yarn may decide the outcome of your product

Yarn construction is a major factor in the "engineering" of base fabrics!

The construction of the yarn from which a base fabric will be woven pre-determines a number of fabric characteristics. Breaking strength, flexibility, bulking, absorption, and adhesion to other materials are affected by such things as type of fiber, yarn size and weight, twist, plies, and many other factors.

Obviously, engineering proper yarn construction calls for specialized experience, if every detail is to be considered thoroughly, in the light of the base fabric's ultimate assignment. At Wellington Sears, we've had over a century of experience in doing just that. Which is why you can have greater assurance that the base fabric you finally use is completely engineered for *your* job. For informative booklet, "Fabrics Plus," write Dept. H-1.

WELLINGTON SEARS

FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

WEST POINT TEXTILES
WEST POINT MANUFACTURING CO

WELLINGTON SEARS CO., 65 Worth St., N. Y. • Atlanta • Boston
Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

Synthetic Rubbers and Latices*

Monomers

Acrylonitrile	lb.	$0.27
Butadiene	lb.	.15
Dow Styrene N99, H99	lb.	.205
RG	lb.	.17
Vinyltoluene	lb.	.17
Hylene M	lb.	3.50 / $5.00
M-50	lb.	1.90 / 3.40
T	lb.	1.10 / 2.65
TM	lb.	.95 / 2.50
-65	lb.	1.00 / 2.55
Isobutylene	lb.	.38
Isoprene	lb.	.25
Monomer MG-1	lb.	1.00 / 1.25
Mondur-C	lb.	1.05
S	lb.	.85
Multron R-2	lb.	.54
Rohm & Haas ethyl acrylate	lb.	.34 / .36
Glacial methacrylic acid	lb.	.45 / .47
Methyl acrylate	lb.	.37 / .39
Methacrylate	lb.	.29 / .31

Shortstops

DDM	lb.	.75 / .88
Mercaptan 174	lb.	.38 / .50
Shortstop 204	lb.	.33 / .37
268	lb.	.52 / .53
Tecquinol	lb.	.825 / .845
Thioston K	lb.	.53
N	lb.	.41
Vulnatol KM	lb.	.52 / .53
NM	lb.	.38 / .42

Acrylic Types

Hycar 4021	.35a
4501	.51a

Fluorocarbon Types

Kel-F Elastomer	lb. 15.00 / 16.15
Viton A	.45a

Isobutylene Types

Neoprene

Neoprene Type AC, GS	.55a
GN, GN-A, WX	.41a
GRT, S	.42a
KNR	.75a
W, WHV	.39a
WRT	.45a

Latices

Neoprene Latex 571, 842-A	.37a
572	.39a
60, 601-A	.40a
635	.41a
650	.42 / .53a
735, 736	.38a
750	.39 / .50a
950	.47a

Nitrile Types

Butaprene NAA	.54a
NF	.49a
NL	.50a
NXM	.58a
Chemigum N1NS	.64b
N3NS, N5	.58b
N6, N-6B, N7	.50b
Hycar 1001, 1041	.58a
1002, 1042, 1043, 1312	.50a
1014	.60a
1411	.62a
1432	.50a
1441	.64a
Paracril AI	.485a
B, BJ, BJLT, BLT	.50a
C, CLT	.58a
CV	.59a
D	.65a
18-80	.60a
Polysar Krynac 800, 802, 803	.50a
801	.58a

Latices

Butaprene N-300	.46b
N-400, N-401	.54b
Chemigum 200	.49b
235 CHS, 236	.54b
245 B, 245 CHS, 246, 247	.46b
Hycar 1512, 1552, 1562, 1577	.46a
1551, 1561, 1571	.54a
1852	.46a
Nitrex 2612, 2614	.46a
2615	.51a

Polyethylene Type

Hypalon 20	lb.	.65

Polysulfide Types

Thiokol LP-2, -3, -31, -32, -33	$0.96a
-8, -38	1.25a
PR-1	.95a
Type-A	.47a
FA	.69a
ST	1.00a

Latices

Thiokol Latex (dry wt.)	
Type MF	.85a
MX	.70a
WD-2	.92a
-5	.95a
-6, -7	.70a

Silicone Types

GE (compounded)	$2.25a / 4.10a
Silicone gum (not compounded)	3.85b / 4.90a
Silastic (compounded)	1.95b / 3.65b
(Partly compounded)	3.25b / 4.35b
(Uncompounded)	3.85b / 4.50b
Union Carbide (compounds)	2.35b / 3.20b
(Gums)	3.85b / 4.25b

Styrene Types†

Hot SBR‡

Ameripol 1000, 1001, 1006	.241a
1002	.2435a
ASRC 1000, 1001, 1004, 1006	.241a
1018	.270a
1019	.265a
FR-S 1000, 1001, 1004, 1006	.241a
1009	.2475a
1010	.26a
1012	.2425a
1013	.255a
1014	.251a
Philprene 1000, 1001, 1002, 1006, 1009, 1010, 1012, 1013, 1014	.241a
S-1000, -1001, -1006, -1013	.241a
-1002, -1011	.2425a
Synpol 1000, 1001, 1006, 1007, 1061	.241a
1002	.2435b
1012	.2425b
1009	.2475b
1013	.256b

* Prices are per pound carload or tank-car dry weight unless otherwise specified.

a Freight extra.

b Minimum freight allowed.

c Freight prepaid.

‡SBR—Styrene-butadiene rubber.

§BR—Butadiene rubber.

† Listed below are the new SBR type synthetic rubbers and latices trade names and the chief sales offices of their producers or distributors.

Ameripol—Goodrich-Gulf Chemicals, Inc., 3135 Euclid Ave., Cleveland 15, O.

ASRC—American Synthetic Rubber Corp., 500 Fifth Ave., New York 36, N. Y.

Baytown—United Rubber & Chemical Co., Baytown, Tex. (producer); United Carbon Co., Inc., Charleston 27, W. Va. (distributor).

Butaprene, FR-S—Firestone Tire & Rubber Co., Synthetic Rubber Division, 381 Wilbeth Rd., Akron 1, O.

Copo—Copolymer Rubber & Chemical Corp., P. O. Box 2595, Baton Rouge 1, La.

Naugapol, Naugatex—Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

Philprene—Phillips Chemical Co. Rubber Chemicals Division, 318 Water St., Akron 8, O.

Plioflex—Goodyear Tire & Rubber Co., Chemical Division, Akron 16, O.

Pliolite Latex—Goodyear Tire & Rubber Co., Chemical Division. Also distributed by General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass.

Polysar—Polymer Corp., Ltd., Sarnia, Ont., Canada (producer); H. Muehlstein & Co., Inc., 60 E. 42nd St., New York 17, N. Y. (distributor).

S—Shell Chemical Corp., Synthetic Rubber Sales Division, 50 W. 50th St., New York 20, N. Y.

Synpol—Texas-U. S. Chemical Co., Port Neches, Tex. (producer); Naugatuck Chemical (distributor).

Hot SBR Black Masterbatch

Philprene 1100	$0.194
1104	.190b
S-1100	.185a

Cold SBR

Ameripol 1500, 1501, 1502	.241
ASRC 1500, 1502	.241a
1503	.2625a
Copo 1500, 1502	.241a
1505	.261a
FR-S 1500, 1502	.241a
Naugapol 1503	.2625b
1504	.295b
Philprene 1500, 1502	.241b
1503	.2625b
Plioflex 1500, 1502	.241a
Polysar Krylene	.241a
S-1500, -1501, -1502	.23b
Synpol 1500, 1502, 1551	.241b

Cold SBR Black Masterbatch

Baytown 1600, 1601, 1602	.176a
Philprene 1600, 1601	.193b
1605	.19b
S-1600, -1601, -1602	.1825a

Cold SBR Oil Masterbatch

Ameripol 1703	.206a
1705	.2035a
1707	.191a
1710, 1712	.1885a
ASRC 1703	.206a
1708	.191a
Copo 1712	.1885a
FR-S 1703	.206a
1705	.2035a
1712	.1885a
Philprene 1703	.206b
1706	.203b
1708	.191b
1712	.1885b
Plioflex 1701, 1775	.206a
1707, 1708	.191a
1712	.1885a

Cold SBR Oil-Black Masterbatch

Baytown 1801	.16a
Philprene 1803	.174b
S-1801	.1675a
-1803	.165a

Hot SBR Latices

FR-S 2000, 2001	.3325a
2002, 2003, 2004	.35a
2006	.372a
Naugatex 2000, 2001, 2006	.263a
2002	.288a
2005	.30a
Pliolite Latex 2000, 2001	.2775a
2076	.29a
S-2000	.2275a
2006	.215a

Cold SBR Latices

Copo 2101, X-765	.30a
2102, 2105	.32a
FR-S 2105	.356a
Naugatex 2101	.285a
2105	.312a
X-767	.323a
Pliolite Latex 2101, X765	.30a
2105	.32a
S-2101	.225a
-2105	.31a
-2107	.32a

Cold BR Latex§

Pliolite Latex 2104	.32a

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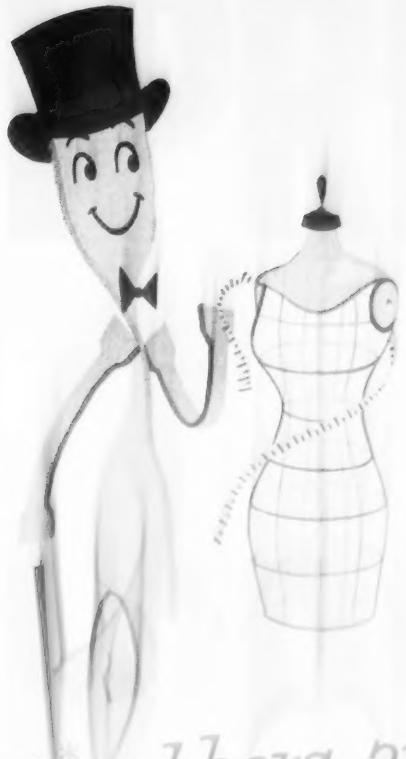
Compound 37-021

Parker Rubber Division, Parker-Hannifin Corp., Cleveland 12, O., reports the development of a new synthetic rubber compound 37-021, which has been verified to be exceptionally water stable and may be particularly useful to manufacturers of domestic laundry machines.



Philprene rubbers are tailored to your specifications!

CURRENT PHILPRENE POLYMERS		
	NON-PIGMENTED	PIGMENTED WITH PHILBLACK*
HOT	PHILPRENE 1000 PHILPRENE 1009 PHILPRENE 1001 PHILPRENE 1010 PHILPRENE 1006 PHILPRENE 1018 PHILPRENE 1019	PHILPRENE 1100 (Pigmented with EPC Black) PHILPRENE 1104
COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1600 PHILPRENE 1601 PHILPRENE 1605
COLD OIL	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1712	PHILPRENE 1803

There's a Philprene polymer to fit your individual requirements. With 20 different Philprene rubbers to choose from, you can select one that's practically custom-made for your operation.

Refer to our new Philprene brochure for the polymer best suited to your product. Phillips also maintains a staff of technical representatives who are thoroughly familiar with the rubber field and its problems. Consult your Phillips technical representative. Take advantage of this valuable advisory service.

*A trademark

PHILLIPS CHEMICAL COMPANY
Rubber Chemicals Division • 318 Water Street, Akron 8, Ohio
District Offices: Chicago, Providence and Trenton • Warehouses: Akron, Boston, Chicago, Trenton

Compounding Ingredients*

Abrasives

Pumicestone, powdered	lb.	$0.0363 /	$0.065
Rottenstone, domestic	lb.	.03 /	.04
Shelblast	ton	80.00 /	165.00
Walnut Shell Grits	ton	50.00 /	160.00

Accelerators

A-1 (Thiocarbanilide)	ton	.50 /	.57
A-32	ton	.66 /	.80
A-100	lb.	.52 /	.66
Accelerator 49		.59 /	.60
52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	4.25	
89	lb.	1.20	
108	lb.	.91	
552	lb.	2.25	
808	lb.	.66 /	.68
833	lb.	1.17 /	1.19
Altax	lb.	.50 /	.52
Arazate	lb.	2.25	
Beutene	lb.	.66 /	.71
Bismate	lb.	3.00	
B-L-F	lb.	.27 /	.32
Butasan	lb.	1.04	
Butazate	lb.	1.04	
Butyl Accelerator Eight	lb.	1.10 /	1.35
Zimate	lb.	1.04	
Captax	lb.	.40 /	.43
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Eths	lb.	.85	
Dicaseres N		.50 /	.57
Dipac	lb.	.85	
DOTG (diorthotolylguanidine)			
Cynamid	lb.	.64	.65
Du Pont	lb.	.63	.64
DPG (diphenylguanidine)			
Cynamid	lb.	.54	.55
Monsanto	lb.	.53 /	.58
Ekasty	lb.	.63	.64
Ethasan	lb.	1.04	
Ethazate	lb.	1.04	
50-11	lb.	.85	
Ethyl Thiurad	lb.	1.04	
Tuads	lb.	1.04	
Tues	lb.	1.04	
Zimate	lb.	1.04	
Ethylac #830	lb.	.93 /	.95
Guantal	lb.	.60 /	.67
Hepteen	lb.	.44 /	.80
Base	lb.	1.85	
Ledate	lb.	1.04	
MBT (2-mercaptobenzothiazole)			
American Cynamid	lb.	.44 /	.46
Du Pont	lb.	.42 /	.44
Naugatuck	lb.	.42 /	.47
XXX, Cynamid	lb.	.55 /	.57
MBTS (mercaptobenzothiazyl disulfide)			
Cynamid	lb.	.54 /	.56
Du Pont	lb.	.52 /	.54
Naugatuck	lb.	.52 /	.57
-W Cynamid	lb.	.59 /	.61
Merac #225	lb.	.75 /	1.05
Mertax	lb.	.55 /	.57
Methasan	lb.	1.04	
Methazate	lb.	1.04	
Methyl Tuads	lb.	1.14	
Zimate	lb.	1.04	
Monex	lb.	1.14	
Mono-Thiurad	lb.	1.14	
2-MT (2-mercaptothiazoline)			
Cynamid	lb.	.88 /	.90
Du Pont	lb.	1.00	
NOBS No. 1	lb.	.76 /	.78
Special	lb.	.80 /	.82
O-X-A-F	lb.	.53 /	.58
Pentex	lb.	1.14	
Flour	lb.	.26	
Permalux	lb.	2.17	
Phenex	lb.	.52 /	.59
Pip-Pip		2.07	
R-2 Crystals	lb.	4.35	
Rotax	lb.	.51 /	.53
RZ-50, -50B	lb.	1.00	
S. A. 52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	2.50	
Santocure	lb.	.76 /	.78
NS	lb.	.80 /	.82
Selenacs	lb.	4.25	
SPDX-GH	lb.	.69 /	.74
GL	lb.	1.20 /	1.34
Tellurac	lb.	1.21	
Tepidone	lb.	.45 /	.48
Tetrone A	lb.	1.91	
Thiofide	lb.	.54 /	.56
S	lb.	.64 /	.66
Thionex	lb.	1.14	
Thiotax	lb.	.44 /	.46
Thiurad	lb.	1.14	
Thiuram E	lb.	1.04	
M	lb.	1.14	
Trimene	lb.	.56 /	.62
Base	lb.	1.03 /	1.10
Tuex	lb.	1.14	
Ultex	lb.	1.00 /	1.10
Unads	lb.	1.14	
Ureka Base	lb.	.66 /	.73
Vulcacure NB	lb.	.45	
NS	lb.	.75 /	1.05
ZB, ZE, ZM	lb.	.85 /	.89
Z-B-X	lb.	$2.45	
Zenite	lb.	.52 /	$0.54
A	lb.	.62 /	.64
Special	lb.	.53 /	.55
Zetax	lb.	.51 /	.53
Zimate	lb.	1.04	

Accelerator-Activators, Inorganic

Lime, hydrated	ton	21.96	
Litharge, commil	lb.	.1575 /	.18
Eagle, sublimed	lb.	.1585	
National Lead, sublimed	lb.	.1635 /	.19
Red lead, commil	lb.	.185 /	.195
Eagle	lb.	.1625	
National Lead	lb.	.19	
White lead, carbonate	lb.	.19 /	.20
Eagle	lb.	.175 /	.185
National Lead	lb.	.175 /	.185
Silicate	lb.	.1725 /	.1825
Eagle	lb.	.16 /	.2175
National Lead	lb.	.16 /	.17
Zinc oxide, commil.†	lb.	.145 /	.1925

Accelerator-Activators, Organic

Aktone	lb.	.3125 /	.3425
Barak	lb.	.63	
Capital 170	lb.	.30 /	.35
171	lb.	.1425 /	.1925
700, 701	lb.	.175 /	.325
705, 710	lb.	.175 /	.325
800	lb.	.1425 /	.1575
801	lb.	.165 /	.19
802	lb.	.17 /	.195
803	lb.	.1625 /	.2175
Cutade	lb.	.57 /	.59
D-B-A	lb.	1.95	
Emery 600	lb.	.1425 /	.1925
Groco 40	lb.	.1425 /	.1925
48	lb.	.1425 /	.1675
Guantal	lb.	.63	.64
Hyfac 400	lb.	.1064 /	.1375
440	lb.	.1613 /	.1638
441	lb.	.1837 /	.215
Hystrene 8.97	lb.	.1801 /	.2138
T-45	lb.	.1638 /	.19
T-70	lb.	.1738 /	.20
Industrene B	lb.	.1363 /	.1538
R	lb.	.1138 /	.13
188	lb.	.1313 /	.1525
284	lb.	.1413 /	.1675
282	lb.	.1513 /	.1775
Lauxes	lb.	.33 /	.37
MOTX	lb.	.295 /	.348
NA-22	lb.	1.00	
Oleic acid, commil	lb.	.188 /	.225
Emersol 210 Flame	lb.	.17 /	.22
Groco 2, 4, 8, 18	lb.	.175 /	.225
Plastone	lb.	.27 /	.30
Polvac	lb.	1.85	
Ridacto	lb.	.28 /	.26
Seedine	lb.	.1485 /	.1703
Stearex Beads	lb.	.1488 /	.1588
Stearic acid			
Emersol 120	lb.	.10	
150	lb.	.2225	
Hydrofoil 51	lb.	.09	
Hydrogenated, rubber grd.			
Groco 56	lb.	.1275 /	.1525
Rufat 75	lb.	.1062 /	.1325
Single pressed, commil	lb.	.1475 /	.1675
Emersol 110	lb.	.1533 /	.185
Groco 53	lb.	.165 /	.19
Wilmar 253	lb.	.1525 /	.1775
Double pressed, commil	lb.	.1525 /	.1725
Groco 54	lb.	.17 /	.195
Wilmar 254	lb.	.1575 /	.1825
Triple pressed, commil	lb.	.175 /	.195
Groco 55	lb.	.1925 /	.2175
Wilmar 255	lb.	.1875 /	.2125
Sterene 60-R	lb.	.09 /	.1075
Tonox	lb.	.515 /	.605
Vimbra	lb.	.32 /	.385
Vulklor	lb.	.88 /	1.08
Wilmar 110	lb.	.17 /	.22
434	lb.	.1425 /	.1925
Zinc stearate, commil	lb.	.39 /	.44

Antioxidants

AC-1	lb.	.37 /	.86
-5	lb.	1.49 /	1.63
AgeRite Alba	lb.	2.35 /	2.45
Gel	lb.	.64 /	.66
H. P.	lb.	.72 /	.74
Hipar	lb.	.98 /	1.00
Powder	lb.	.52 /	.54
Resin	lb.	.75 /	.77
D	lb.	.52 /	.54
Spar	lb.	.52 /	.54
Stalite	lb.	.52 /	.54
S	lb.	.52 /	.54
White	lb.	1.45 /	1.55
Akroflex C	lb.	.81 /	.83
CD	lb.	.76 /	.78

* Prices, in general, are f.o.b. works. Range indicates grade or quantity variations. No guarantee of these prices is made. Spot prices should be obtained from individual suppliers.

† For trade names, see Color—White, Zinc Oxides.

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

Albasan	lb.	$0.69 /	$0.73
Allied AA 1144	lb.	.23	.24
AA-1177	lb.	.155 /	.165
Aminox	lb.	.55 /	.60
Antioxidant 425	lb.	2.47 /	2.50
2246	lb.	1.50 /	1.53
Antisol	lb.	.23 /	.24
Antisun	lb.	.15 /	.51
Antox	lb.	.55 /	.57
Aranox	lb.	3.25 /	.54
Betanox Special	lb.	.85 /	.90
B-L-E, -25	lb.	.55 /	.60
Burgess Antisun Wax	lb.	.185	
B-X-A	lb.	.55 /	.60
Catalin AC-5	lb.	1.49 /	1.63
Copper Inhibiter X-872-L	lb.	2.01	
D-B-P-C	lb.	.91 /	1.16
Flectol H	lb.	.57 /	.59
Flexamine	lb.	.76 /	.81
Heliozone	lb.	.31 /	.32
Ionol	lb.	.91 /	1.65
Microflake	lb.	.20 /	.24
NBC	lb.	1.55	
Neozone A	lb.	.59 /	.61
C	lb.	.83	
D	lb.	.55 /	.57
Nevastain A	lb.	.51 /	.61
B	lb.	.51 /	.70
Octamine	lb.	.55 /	.60
PDA-10	lb.	.46 /	.48
Perflectol	lb.	.61 /	.68
Permalux	lb.	2.17 /	
Polygard	lb.	.55 /	.60
Polylite	lb.	.55 /	.60
Protector	lb.	.36 /	.41
Rio Resin	lb.	.60 /	.62
Santoflex 13	lb.	.73 /	.79
75	lb.	1.01 /	1.03
AW	lb.	.79 /	.81
B	lb.	.54 /	.59
BX	lb.	.63 /	.70
DD	lb.	.57 /	.59
Santovar A	lb.	1.55 /	1.57
Santowhite Crystals, Powder	lb.	1.55 /	1.64
I	lb.	.57 /	.59
MK	lb.	1.25 /	1.34
Stabilite	lb.	.55 /	.59
Alba	lb.	.73 /	.79
I	lb.	.60 /	.64
White	lb.	.81 /	.60
Powder	lb.	.11 /	.17
Stratton 1	lb.	.51 /	.55
Sunolite #100	lb.	.11 /	.13
#127	lb.	.17 /	.19
Sunproof 713	lb.	.25 /	.30
Improved	lb.	.25 /	.30
Jr.	lb.	.20 /	.25
Tenamene 3	lb.	.91 /	1.08
Thermoflex	lb.	1.00 /	1.02
Tonox	lb.	.52 /	.57
Tyamite	lb.	.24 /	.2475
Velvapex 31-280	lb.	.40 /	
V-G-B	lb.	.75 /	.80
Wing-Stay S	lb.	.55 /	.67
Zalba	lb.	1.10	
Zenite	lb.	.52 /	.54

Antiozonants

Tenamene 30, 31	lb.	1.24 /	1.28
UOP 88, 288	lb.	1.24 /	1.26

Antiseptics

Copper naphthenate, 6-8%	lb.	.245	
Pentachlorophenol	lb.	.22 /	.30
Resorcinol, technical	lb.	.775 /	.785
Zinc naphthenate, 8-10%	lb.	.245 /	.30

Blowing Agents

Ammonium bicarbonate	lb.	.07 /	.09
Carbonate	lb.	.16	
Blowing Agent CP 1475	lb.	.32 /	.35
Celogen	lb.	1.95	
50 C	lb.	1.01 /	1.07
Kempore R-125	lb.	1.95	
Opex 40	lb.	.76	
Sodium bicarbonate	100 lbs.	2.55 /	3.85
Carbonate, tech.	100 lbs.	1.35 /	5.52
Sponge Paste	lb.	.20	
Unicel ND	lb.	.76	
NDX	lb.	1.52	
S	lb.	.20	

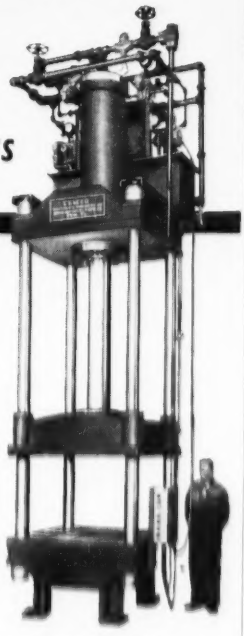
Bonding Agents

Braze	gal.	6.00 /	9.00
Cover cement	gal.	2.50 /	4.00
Chemlok 201, 203	gal.	5.00 /	7.50
220	gal.	9.25 /	12.00
401	gal.	11.70 /	14.40
602	gal.	25.00 /	26.00
607	gal.	18.00 /	
614	lb.	4.35 /	4.75
Flocking Adhesive RFA17, RFA22, RFA25	lb.	.50	
G-E Silicone Paste SS-15	lb.	4.52 /	5.10
SS-64	lb.	3.65 /	6.75
-67 Primer	lb.	7.50 /	12.50
Gen-Tac Latex	lb.	.70 /	.805
Hylene M	gal.	3.50 /	3.75
M-50	gal.	1.90 /	2.15
Kalabond Adhesive	gal.	6.50 /	16.00
Tie Cement	gal.	2.00 /	5.60
Thixons	gal.	1.48 /	12.00
Ty Ply, BN, Q, S, UP, 3640	gal.	6.75 /	8.00
RC	gal.	3.75 /	5.00

ERIE ENGINE & MFG. CO.

PRESSES

FOR REINFORCED PLASTICS



EEMCO designers and builders offer you the advantage of having complete installations for reinforced plastics molding—including presses, hydraulic units, preform machines, roving cutters and ovens. Why not consult EEMCO and ask for quotations on any complete or partial fiberglass molding installations?

EEMCO ERIE ENGINE & MFG. CO.

951 East 12th St., ERIE, PA.

Cambridge Surface Pyrometers Help CONGOLEUM-NAIRN Make Better Floor Coverings

In Congoleum-Nairn's Delaware Floor Products Plant, *Cambridge Roll Pyrometers* are used to check the surface temperatures of the polishing roll in the processing of vinyl floor coverings. Proper temperature is a vital factor in maintaining uniform quality of the product. Because they are accurate, quick-acting and rugged instruments, Cambridge Pyrometers are widely used in many industries for routine production purposes as well as in the laboratory.

Send for BULLETIN 194A

Combination and single purpose Cambridge Pyrometers are described in Bulletin 194A

CAMBRIDGE INSTRUMENT CO., INC.
3532 Grand Central Terminal, New York 17, New York

CAMBRIDGE
ROLL NEEDLE MOLD PYROMETERS

THE ALUMINUM FLAKE COMPANY

AKRON 14, Ohio

Manufacturers and distributors of

ALUMINUM FLAKE

A colloidal hydrated aluminum silicate FILLER FOR SYNTHETIC AND NATURAL RUBBER.

A. F. D. Filler

For adhesives, with Polyamides

NEW ENGLAND AGENTS: H. A. SCHLOSSER & CO.
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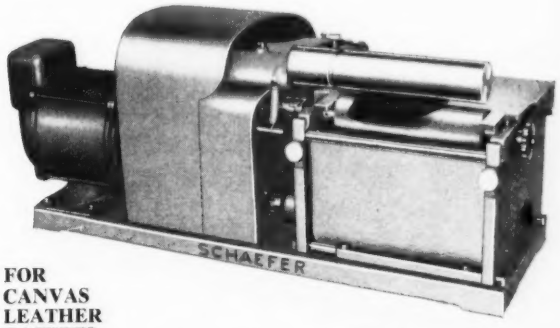
Providence 1, R. I.
WAREHOUSE STOCKS

Schaefer GLUERS & CEMENTERS



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GASKETS
ASBESTOS
FIBREGLAS
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HARD RUBBER
FOAM RUBBER
PLASTIC FOAM
SPONGE RUBBER
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Versatile Schaefer Cementers are practical for latex and solvent rubber cements. Bench machines for short runs and conveyor machines to cement the top side of sheets for production. 8" to 60" wide. Ideal for rubber industry.

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FIBRE
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Schaefer MACHINE COMPANY, INC.
141 Front St. • Bridgeport 6, Conn.

WATERGROUND
MICA
WHITE and BIOTITE

A MORE UNIFORM MICA FROM OUR OWN DOMESTIC MINES

LOWEST PRICED . . . FROM OUR OWN LARGER SOURCE

The English Mica Co.

STERLING BUILDING · STAMFORD, CONN.

Brake Lining Saturants

BRT 3	lb.	$0.018 /	$0.0265
Resinex L-S	lb.	.0225/	.03

Carbon Blacks‡

Conductive Channel—CC

Continental R-40	lb.	.23 /	.30
Kosmos/Dixie BB	lb.	.23 /	.30
Spheron C	lb.	.15 /	.195
Voltex	lb.	.18 /	.315

Easy Processing Channel—EPC

Collocarb EPC	lb.	.059 /	.099
Continental AA	lb.	.074 /	.1225
Kosmobile 77/Dixiedensed 77	lb.	.074 /	.1225
Micronex W-6	lb.	.0775/	.145
Spheron #9	lb.	.0725/	.1225
Texas E	lb.	.074 /	.1225
Witco #12	lb.	.074 /	.1225
Wyex EPC	lb.	.0775/	.135

Hard Processing Channel—HPC

Continental F	lb.	.074 /	.1225
HX HPC	lb.	.074 /	.1225
Kosmobile S/Dixiedensed S	lb.	.074 /	.1225
Micronex Mk. II	lb.	.0775/	.145
Witco #6	lb.	.074 /	.1225

Medium Processing Channel—MPC

Arrow MPC	lb.	.0775/	.135
Continental A	lb.	.074 /	.1225
Kosmobile S-66/Dixiedensed S-66	lb.	.0775/	.145
Micronex Standard	lb.	.0725/	.145
Spheron #6	lb.	.0725/	.1225
Texas 109	lb.	.079 /	.1275
M	lb.	.074 /	.1225
Witco #1	lb.	.074 /	.1225

Conductive Furnace—CF

Aromex CF	lb.	.0875/	.145
Vulcan C	lb.	.105 /	.15
SC	lb.	.18 /	.223

Fast Extruding Furnace—FEF

Arovel FEF	lb.	.0675/	.125
Continex FEF	lb.	.06 /	.10
Kosmos 50/Dixie 50	lb.	.06 /	.10
Philblack A	lb.	.0675/	.115
Statex M	lb.	.0675/	.125
Sterling SO	lb.	.0625/	.10

Fine Furnace—FF

Statex B	lb.	.0725/	.13
Sterling 99	lb.	.0675/	.105

High Abrasion Furnace—HAF

Aromex HAF	lb.	.0775/	.135
Continex HAF	lb.	.079 /	.125
Kosmos 60/Dixie 60	lb.	.079 /	.1175
Philblack O	lb.	.0775/	.125
Statex R	lb.	.0775/	.135
Vulcan #3	lb.	.0725/	.114

Intermediate Super Abrasion Furnace—ISAF

Aromex ISAF	lb.	.0925/	.15
Kosmos 70/Dixie 70	lb.	.10 /	.145
Philblack I	lb.	.0925/	.14
Statex 125	lb.	.0925/	.15
Vulcan 6	lb.	.0875/	.13

Super Abrasion Furnace—SAF

Philblack E	lb.	.115 /	.1625
Vulcan 9	lb.	.115 /	.165

General-Purpose Furnace—GPF

Arogen GPF	lb.	.06 /	.1175
Sterling V	lb.	.055 /	.09
V Non-staining	lb.	.05 /	.09

High Modulus Furnace—HMF

Collocarb HMF	lb.	.045 /	.085
Continex HMF	lb.	.055 /	.095
Kosmos 40/Dixie 40	lb.	.055 /	.095
Modulex HMF	lb.	.0625/	.12
Statex 93	lb.	.0625/	.12
930	lb.	.047 /	.087
Sterling L, LL	lb.	.0575/	.095

Semi-Reinforcing Furnace—SRF

Collocarb SRF	lb.	.042 /	.082
Continex SRF	lb.	.045 /	.085
Essex SRF	lb.	.0575/	.115
Furnex	lb.	.0575/	.115
Gastex	lb.	.0575/	.0925
Kosmos 20/Dixie 20	lb.	.045 /	.085
Pelletex, NS	lb.	.0525/	.0875
Sterling NS, S	lb.	.0475/	.0875
R	lb.	.0575/	.0925

Fine Thermal—FT

P-33	lb.	.0575	
Sterling FT	lb.	.0575	

Medium Thermal—MT

Sterling MT	lb.	$0.04	
Non-staining	lb.	.05	
Thermax	lb.	.04	
Stainless	lb.	.05	

Colors

Black

Iron oxides, comml.	lb.	.1235/	$0.135
BK—Lansco	lb.	.1275/	.13
Williams	lb.	.145	
Lansco synthetic	lb.	.10	
Mapico	lb.	.1475/	.15
Lampblack, comml.	lb.	.16 /	.45
Superjet	lb.	.085 /	.12
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	.45 /	1.20
Vansul masterbatch	lb.	.60 /	.65
Paste	lb.	.14 /	.15

Blue

Alkali Blue	lb.	1.12 /	2.10
C. P. Iran Blues	lb.	.52 /	.54
Du Pont	lb.	1.77 /	4.55
Filo	lb.	.28	
Heveatex pastes	lb.	.80 /	1.45
Lansco ultramarines	lb.	.25 /	.28
Monsanto Blue 7	lb.	1.55	
11	lb.	3.45	
DPB-283	lb.	1.93	
S-11	lb.	2.05	
Permanent Blue	lb.	.80 /	1.05
Stan-Tone Violet Blue D-4900	lb.	1.97 /	2.15
Vansul masterbatch	lb.	.90 /	2.70

Brown

Filo	lb.	.13	
Iron oxides, comml.	lb.	.1425/	.145
Lansco synthetic	lb.	.125	
Mapico Brown	lb.	.1575/	.16
Sienna, burnt, comml.	lb.	.0425/	.155
Williams	lb.	.115 /	.1775
Raw, comml.	lb.	.045 /	.1325
Williams	lb.	.08 /	.1725
Umber, burnt, comml.	lb.	.06 /	.07
Williams	lb.	.0725/	.085
Raw, comml.	lb.	.0625/	.07
Williams	lb.	.07 /	.0825
Williams, pure brown	lb.	.155	
Vandyke	lb.	.12	
Mapico Tan	lb.	.2325/	.235
Metallic Brown	lb.	.05 /	.06
Vansul masterbatch	lb.	2.10 /	2.20

Green

Chrome	lb.	.19 /	.50
Green	lb.	.80 /	2.40
Oxide	lb.	.3925/	1.10
Cyanamid	lb.	.42 /	.44
G-4099, -6099	lb.	.4525	
GH-9869	lb.	1.10 /	1.25
9976	lb.	1.20 /	1.35
Du Pont	lb.	1.97 /	2.80
Filo	lb.	.40	
Heveatex pastes	lb.	.95 /	1.85
Lansco Toner	lb.	1.35	
Monsanto Green 3	lb.	2.75	
14	lb.	1.45	
17	lb.	3.95	
71205	lb.	1.35	
DGP	lb.	2.03	
S-17	lb.	2.25	
Stan-Tone	lb.	1.75 /	4.60
Vansul masterbatch	lb.	2.00 /	2.60

Orange

Cyanamid Permatons	lb.	1.50 /	1.56
Du Pont	lb.	2.75	
Monsanto Orange 68187	lb.	2.90	
Stan-Tone			
Light orange D-7003	lb.	4.06 /	4.26
70 PCO3	lb.	2.50 /	2.92
Orange 70 PCO4	lb.	2.90 /	3.32
D-7004	lb.	4.48 /	4.68
D-7104	lb.	2.10 /	2.30
Vansul masterbatch	lb.	2.00 /	2.60

Red

Antimony trisulfide	lb.	.285 /	.315
R. M. P. No. 3	lb.	.72	
Sulfur Free	lb.	.78	
Brilliant Toning Red	lb.	1.95	
Cadmium red lithopones	lb.	2.21 /	3.77
Cadmolith	lb.	1.72 /	2.20
Cyanamid	lb.	.93 /	1.90
Du Pont	lb.	1.47 /	1.90
Filo	lb.	.11	
Indian Red	lb.	.1275	
Iron oxide, comml.	lb.	.06 /	.13
Lansco synthetic	lb.	.1175	
Mapico	lb.	.1425/	.145
Recco	lb.	.12	
Williams Red	lb.	.13 /	.1525
Monsanto Maroon 113	lb.	1.50	
61148	lb.	1.75	
Red 7	lb.	1.55	
41	lb.	4.40	
3501	lb.	1.15	
4004	lb.	1.50	
69191	lb.	3.38	
Autumn	lb.	1.10	
PRP-285	lb.	1.27	
S-44	lb.	1.28	
Rub-Er-Red	lb.	$0.0975	
Stan-Tone			
Light Red D-7005	lb.	5.23 /	$5.43
D-7105	lb.	2.26 /	2.46
70 PCO5	lb.	3.23 /	3.63
Red D-7006	lb.	5.52 /	5.72
D-7106	lb.	2.59 /	2.79
70 PCO6	lb.	3.63 /	4.05
Vansul masterbatch	lb.	.95 /	3.30
Venetian	lb.	.04 /	.0675

White

Antimony oxide	lb.	.27 /	.285
Burgess Iceberg	ton	50.00 /	80.00
Cryptone BT	lb.	10 /	.11
Permolith lithopone	lb.	.08 /	.087
Titanium pigments			
Horse Head Anatase	lb.	.255 /	.27
Rutile	lb.	.275 /	29
Rayox LW	lb.	.195 /	.205
R-110	lb.	.215 /	.225
Ti-Cal	lb.	.075 /	.0825
Ti-Pure	lb.	.195 /	.225
Titanox A, AA, A-168	lb.	.21 /	.22
C-50	lb.	.1225/	.1275
RA, -10, -50	lb.	.23 /	.24
RC	lb.	.0825/	.0875
-11T, -11TX	lb.	.08 /	.085
Unitane	lb.	.255 /	.285
Zopaque Anatase	lb.	.245 /	.27
Rutile	lb.	.205 /	.29
Zinc oxide, comml.	lb.	.145 /	.1825
Azo ZZZ-11, -44, -55	lb.	.145 /	.165
20% leaded	lb.	.1505/	.1705
35% leaded	lb.	.155 /	.175
50% leaded	lb.	.1588/	.1788
Eagle AAA, lead free	lb.	.145 /	.155
5% leaded	lb.	.145 /	.155
35% leaded	lb.	.155 /	.165
50% leaded	lb.	.159 /	.169
Florence Green Seal	lb.	.1625/	.1725
Red Seal	lb.	.1575/	.1675
White Seal	lb.	.1675/	.1775
Horsehead XX-4, -78	lb.	.145 /	.155
Kadox-15, -17, -72, -515	lb.	.145 /	.155
-25	lb.	.1675/	.1775
Lehigh, 35% leaded	lb.	.155 /	.175
50% leaded	lb.	.1588/	.1788
Protox-166, -167	lb.	.145 /	.165
St. Joe, lead free	lb.	.145 /	.175
Zinc sulfide, comml.	lb.	.253 /	.263
Cryptone ZS	lb.	.253 /	.273

Yellow

Cadmium yellow lithopones	lb.	1.12 /	1.15
Cadmolith	lb.	1.12 /	1.20
Cyanamid Hansa Yellow	lb.	2.20	
Du Pont	lb.	1.80 /	2.25
Filo	lb.	.10	
Iron oxide, comml.	lb.	.0525/	.1175
Lansco synthetic	lb.	.1075	
Mapico	lb.	.12 /	.1275
Williams	lb.	.115 /	.1225
Monsanto Yellow 14	lb.	1.91	
10010	lb.	1.91	
BVP-282	lb.	1.21	
GA	lb.	2.45	
S-10010	lb.	1.17	
Stan-Tone			
Lemon 70 PCO1	lb.	1.77 /	2.19
D-7001	lb.	2.80 /	3.00
Medium yellow 70 PCO2	lb.	1.79 /	2.21
D-7002	lb.	2.98 /	3.18
Vansul masterbatch	lb.	.95 /	1.95
Williams Ocher	lb.	.0575/	.06

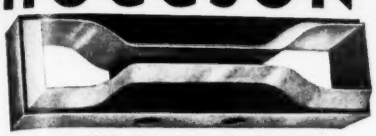
Dusting Agents

Diatomaceous silica	ton	32.00 /	48.00
Extrud-o-Lube, conc.	gal.	1.33 /	1.69
Glycerized Liquid Lubricant, concentrated	gal.	1.25 /	1.63
Latex-Lube GR	lb.	.20	
Pigmented	lb.	.1825	
R-66	lb.	.165	
Liqui-Lube	lb.	.1625	
N. T.	lb.	.1675	
Liquizinc No. 305	lb.	.30 /	.35
Lubrex	lb.	.25 /	.30
Mica Concord	lb.	.075 /	.0825
Mineralite	ton	45.00	
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Talc, comml.	ton	18.40 /	38.50
EM	ton	11.00 /	63.00
LS Silver	ton	29.25	
Nytals	ton	25.00 /	36.00
Sierra Sagger 7	ton	34.00	
White IR	ton	19.75	
III	ton	20.75	
Vanfre	gal.	2.00	

Extenders

BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
Cumar Resins	lb.	.065 /	.17
Dielex B	lb.	.06	
Factice, Amberex	lb.	.29 /	.36
Brown	lb.	.1425/	.263
Neophax	lb.	.157 /	.268
White	lb.	.144 /	.285
G. B. Asphaltenes	lb.	.097 /	.177
Millex, W	lb.	.07	
Mineral Rubbers			
Black Diamond	ton	38.00 /	40.00
Hard Hydrocarbon	ton	46.50 /	48.50
Hydrocarbon MR	ton	45.00 /	55.00
Parmr	ton	21.00 /	29.00
T-MR Granulated	ton	47.50 /	50.00

HOGGSON

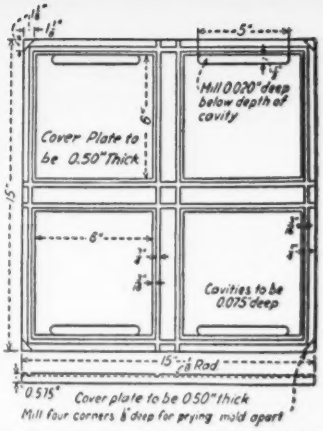


"DUMBBELL" Test Strip Die D412(51T)

TOOLS, MOLDS, DIES
For Rubber Testing and Production

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.

SLAB→ MOLD D15-41



HOGGSON & PETTIS MFG. CO., 141S Brewery St., New Haven 7, Conn.
Pac. Coast: H. M. Royal, Inc., Downey, Calif.

RMP
ANTIMONY FOR RED RUBBER

- ATTRACTIVE
- NON-DETERIORATING

RARE METAL PRODUCTS CO.
ATGLEN, PA.

STEEL CALENDER STOCK SHELLS

ALL STEEL, ALL WELDED CONSTRUCTION, with forged steel hubs for 1¼", 1½" and 2" square bars. 4", 5", 6", 8", 10", 12", 15", 20" and 24" diameters. Any length. Also Special Trucks (Leaf Type) Racks, Tables and Jigs.

Used in manufacturing rubber and plastic products.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

RUBBER HARDNESS
ORIGINAL SHORE
DUROMETER
A-2 SCALE (A.S.T.M. D676)
VARIOUS OTHER MODELS FOR TESTING THE ENTIRE RANGE
TECHNICAL DATA ON REQUEST

THE SHORE INSTRUMENT & MFG. CO. INC.
90-35 VAN WYCK EXPRESSWAY
JAMAICA 35, N.Y.

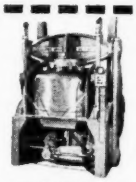
SOFTENERS & PLASTICIZERS FOR RUBBER

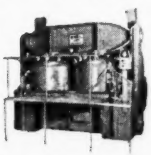
FROM THE PINE TREE

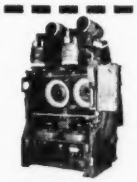
ROSIN OILS • PINE TAR
BURGUNDY PITCH
GALEX – a non-oxidizing ROSIN

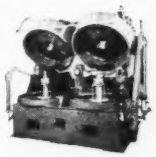
Write for our "Pine Tree Products" and "Galex" Brochures

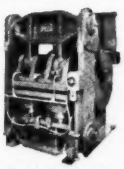
NATIONAL ROSIN OIL PRODUCTS, INC.
Pioneers of the Industry
The Americas Building • Rockefeller Center • New York 20, N. Y.
Exley Avenue, Savannah, Ga.


Model 900-75-25D BAG-O-MATIC Tilt-Back


Model 450-55-16D BAG-O-MATIC Tilt-Back


Model 230-40-11½ Twin BAG-O-MATIC


Model 300-47½-11½D BAG-O-MATIC


Model 800-24x48-7 Electrically Heated Platen

Model 800-32 With Ejector

Model 800-32 Intermediate Platen

Model 300 Transfer Molding Press

Model 150 Transfer Molding Press

THE NAME TO REMEMBER FOR PRECISION

McNEIL
AKRON

Manufacturers of the World's Finest Rubber Curing Equipment

Nuba No. 1, 2	lb.	$0.0575/	$0.0625
3X	lb.	.0775/	.0825
OPD-101	lb.	.26	
Rubber substitute, brown	lb.	.16 /	.2572
Car-Bel-Ex A	lb.	.14	
Car-Bel-Lite	lb.	.35	
Extender 600	lb.	.1765	
White	lb.	.192 /	.2103
Stan-Shells	ton	35.00 /	73.00
Sublac Resin PX-5	lb.	.215 /	.235
Sundex 53	gal.	.12	
85	gal.	.1725	
Synthetic 100	lb.	.41	
Vistanex	lb.	.35 /	.475

Fillers, Inert

Agrashell flour	ton	50.00 /	74.00
Albacar	ton	55.00 /	75.00
Barytes, floated, white	ton	49.00 /	70.85
Off-color, domestic	ton	25.00	
No. 1	ton	55.00 /	77.50
2	ton	50.00 /	72.50
Sparmite	ton	95.00 /	117.00
Blanc fixe	ton	100.00 /	165.00
Burgess Iceberg	ton	50.00 /	80.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00
HC-75	ton	12.00 /	30.00
-80	ton	14.00 /	42.00
WP #1	ton	11.00 /	16.00
Camel-Carb	ton	14.00	
-Wite	ton	35.00	
-Tex	ton	22.00	
Cary #200	ton	30.00 /	55.00
Citrus seed meal	lb.	.04	
Oil	lb.	.15	
Clays			
A. F. D. Filler	ton	29.50 /	36.00
Aiken	ton	14.00	
Albacar	ton	50.00 /	55.00
Aluminum Flake	ton	25.50 /	36.00
#5	ton	27.50 /	34.50
Champion	ton	14.50	
Crown	ton	14.00 /	33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
GK Soft Clay	ton	11.00	
Harwick	ton	15.50 /	55.50
Hi-White R	ton	13.50	
Hydratex R	ton	28.00	
Kaolloid	ton	10.50	
McNamee	ton	13.50	
RX-43	ton	33.00	
Natka 1200	ton	13.00	
Paragon	ton	13.50 /	31.50
Recco	ton	14.00	
Sno-Brite	ton	12.50	
Stan-Clay	ton	28.00	
Stellar-R	ton	50.00	
Suprex	ton	14.00 /	32.00
Swanee	ton	12.50	
Windsor	ton	14.00 /	30.00
DC Silica	lb.	1.45 /	1.65
Diatomaceous silica	ton	32.00 /	48.00
Flocks			
Cotton, dark	lb.	.095 /	.135
Dyed	lb.	.55 /	.60
White	lb.	.13 /	.33
Fabrifil X-24-G	lb.	.135	
X-24-W	lb.	.235	
Filfloc 6000	lb.	.33	
F-40-900	lb.	.135	
HSC #35 Silicone Emulsion	lb.	1.22 /	2.46
Kalite	ton	52.50 /	67.50
Lithopone, comml.	lb.	.075 /	.085
Astrolith	lb.	.068 /	.0675
Eagle	lb.	.0725/	.075
Permolith	lb.	.08 /	.0875
Sunolith	lb.	.075 /	.0825
Mica Concord	lb.	.075 /	.0825
Millical	ton	38.00 /	53.00
Mineralite	ton	40.00 /	60.00
Non-Fer-Al	ton	35.00 /	50.00
Purecal	ton	56.75 /	71.75
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Sawdust	ton	14.00 /	35.00
Silversheen Mica	lb.	.08 /	.09
StanWhite	ton	10.50 /	13.10
Super-White Silica	ton	25.00 /	46.50
Surfex	ton	37.50 /	52.50
MM	ton	42.00 /	57.00
Suspenso	ton	38.00 /	53.00
Ti-Cal	lb.	.0675	
Valron Estersil	lb.	2.00 /	2.25
Walnut shell flours	ton	50.00 /	84.00
Whiting, limestone			
Atomite	ton	32.50 /	35.00
Calcite	ton	23.00	
Calwhite	ton	20.00 /	27.00
-T	ton	23.00	
Duramite	ton	20.00	
Gamaco	ton	32.50 /	40.00
Keystone	ton	20.00 /	22.00
Laminar	ton	30.00	
No. 10 White	ton	11.00 /	16.50
Omya	ton	30.00	
BSH	ton	45.00	
Paxinosa	ton	14.50 /	22.50
Snowflake	ton	17.00 /	18.00
Stonelite	ton	9.00	
Witco	ton	13.00	
York	ton	9.50	

Finishes

Apex Bright Finish #5200-E	lb.	.25	
Rubber Finish	gal.	2.50	
Black-out	gal.	4.50 /	8.00
Flocks, Rayon, colored	lb.	$0.90 /	$1.50
White	lb.	.75 /	1.25
Also see Flocks, under Fillers, Inert			
Paraflint RG and RGU Synthetic Wax	lb.	.15 /	.22
Rubber lacquer, clear	gal.	1.00 /	2.00
Shellacs, Angelo	lb.	.485 /	.7325
Vac Dry	lb.	.485 /	.57
Talc (*See Talc, under Dusting Agents*)			
Unidip	lb.	.15 /	.20
Wax, Bees	lb.	.68 /	.83
Carnauba	lb.	.57 /	1.13
Monten	lb.	.27	
No. 118, colors	gal.	.86 /	1.41
Neutral	gal.	.76 /	1.31
Van Wax	gal.	1.45 /	1.50

Latex Compounding Ingredients

Acintol D, DLR	lb.	.06 /	.075
FA #1	lb.	.065 /	.08
#2	lb.	.075 /	.09
Accelerator 552	lb.	2.25	
J-117, -302	lb.	1.00 /	1.15
-144	lb.	.15 /	.30
-307	lb.	1.10 /	1.25
-311	lb.	.60 /	.75
Aerosol, dry types	lb.	.39 /	1.20
Liquid types	lb.	.40 /	.72
Alcogum AA-16, MA-16	lb.	.20 /	.24
AK-12, PA-10	lb.	.12 /	.14
AN-6	lb.	.05 /	.075
-10	lb.	.085 /	.10
Alrosol	lb.	.41	
Amberex solutions	lb.	.1675/	.18
Antifoam J-114	lb.	3.25 /	3.45
P-242	lb.	.24 /	.35
Antioxidant J-137, -140	lb.	.55 /	.70
-139, -293	lb.	1.45 /	1.60
-182	lb.	2.00 /	2.15
-186	lb.	1.40 /	1.55
2246	lb.	1.50 /	1.53
Anti Webbing Agent J-183	lb.	.75 /	.90
-297	lb.	.27 /	.40
Aquablak B	lb.	.0975/	.1025
G	lb.	.12 /	.125
K	lb.	.12 /	.125
M	lb.	.105 /	.11
Aquarex D	lb.	.78	
G	lb.	.21	
L	lb.	.94	
MDL	lb.	.33	
ME	lb.	.80	
Aquarex NS	lb.	.60	
SMO	lb.	.50	
WAQ	lb.	.22	
Areskap 50	lb.	.30 /	.38
100, dry	lb.	.60 /	.72
Aresket 240	lb.	.30 /	.38
300, dry	lb.	.60 /	.72
Aresklene 375	lb.	.42 /	.57
Ben-A-Gels	lb.	.98 /	1.40
Bentone 18, 18C	lb.	.45	
34	lb.	.60	
Casein	lb.	.22	
Cellosize WP-09, -3, -40			
-300	lb.	1.00 /	1.17
CW-12		.85	
-37	lb.	.70	
DC Antifoam A Compound	lb.	5.45 /	6.65
B	lb.	.68 /	1.20
Emulsion	lb.	2.05 /	4.00
AF Emulsion	lb.	2.05 /	2.85
Compound 7	lb.	5.13 /	6.50
Defoama W-1701	lb.	.125	
Defoamer 115a	lb.	.50	
Dispersing Agents			
Blancol	lb.	.1525/	.26
N	lb.	.155 /	.26
Darvan Nos. 1, 2, 3	lb.	.22 /	.30
Daxad 11, 21, 23, 27	lb.	.08 /	.30
Dispersaid H7A	lb.	.58	
1159	lb.	.43	
Emulphor ON-870	lb.	.50 /	.70
Igepal CO-630	lb.	.2875/	.47
Igepon T-73	lb.	.285 /	.495
T-77	lb.	.45 /	.69
Indulins	lb.	.06 /	.08
Kreelons	lb.	.132 /	.155
Laurelton Oil	lb.	.18	
Leonil SA	lb.	.52 /	.65
Lomar PW	lb.	.18	
Marasperse CB	lb.	.1225/	.1425
N	lb.	.095 /	.105
Modicols	lb.	.17 /	.58
Nekal BA-75	lb.	.395 /	.54
BX-76	lb.	.63 /	.75
Orzan A	lb.	.0325	
S	lb.	.0425	
Pluronics	lb.	.335 /	.40
Polyfons	lb.	.08 /	.09
Sorapon SF-78	lb.	.28 /	.40
Tergitol NPX	lb.	.275 /	.3074
TMN	lb.	.2875/	.32
7	lb.	.4125/	.44
Trenamine W-30	lb.	.15	
W-40	lb.	.60 /	.75
Triton R-100	lb.	.12 /	.25
X-100, -102, -114	lb.	.255 /	.36
Dispersions			
Agebest 1293-22	lb.	1.90 /	2.00
AgeRite Alba	lb.	3.00	
Powder, Resin D	lb.	.80	
White	lb.	1.80	
Altax	lb.	.75	
Shield Nos. 2, 6	lb.	.08	
3	lb.	.095	
4-35	lb.	.09	
5	lb.	.093	
Altax Shield 7-F, 8	lb.	$0.165	
55	lb.	.18	
Iron Oxide, 60%	lb.	.40	
L.S.W.	lb.	1.50	
No. 305 Liquizinc	lb.	.30 /	.35
P-33	lb.	.35	
Rotax	lb.	.75	
Sulfur	lb.	.12 /	.30
No. 2	lb.	.14 /	.16
Telloy	lb.	3.00	
Tuads, Methyl	lb.	1.60	
Vulcacure NB	lb.	.45	
NS	lb.	.75 /	1.05
ZB, ZE, ZM	lb.	.85 /	.89
Vulcanizing, C group	lb.	.40 /	1.30
G group	lb.	.45 /	.90
N group	lb.	.40 /	1.00
Vulcafoams	lb.	.40 /	.70
Vulcanols	lb.	.75 /	.80
Zetax	lb.	.75	
Zimates, Butyl	lb.	1.30	
Ethyl, Methyl	lb.	1.35	
Zinc oxide	lb.	.40	
Emulsions			
AgeRite Stalite	lb.	.75	
Borden Arcco A-25,			
A-26, 716-30	lb.	.18 /	.19
555-40-R	lb.	.185 /	.205
620-32B	lb.	.20 /	.21
716-35	lb.	.17 /	.18
1041-21	lb.	.165 /	.175
Habuco Resin Nos. 502,			
515, 523	lb.	.195 /	.20
503	lb.	.22 /	.225
504, 526	lb.	.19 /	.195
517	lb.	.175 /	.18
524	lb.	.155 /	.16
Resin A-2	lb.	.16 /	.25
P-370	lb.	.175 /	.25
X-210	lb.	.12 /	.22
Freeze-Stabilizer 322	lb.	.40	
12116C	lb.	.52	
Igepon T-43	lb.	.145 /	.35
T-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Ludox	lb.	.1675/	.195
Marmix	lb.	.41 /	.48
Merac	lb.	.75 /	1.05
Micronex, colloidal	lb.	.06 /	.072
Monsanto Blue 4685 WD	lb.	1.60	
Green 4884 WD	lb.	1.80	
Red 127	lb.	1.25	
OPD 101	lb.	.16 /	.26
Picco Latex Plasticizer A-12	lb.	.069 /	.096
Pliolite Latex 150, 190	lb.	.32 /	.41
170	lb.	.37 /	.46
Polyvinyl methyl ether	lb.	.25 /	.45
Resin V	lb.	.13	
Roelgel 100C	lb.	.46	
Santomerse D	lb.	.44 /	.65
S	lb.	.13 /	.25
Sellogen Gel	lb.	.1275	
Sequestrene AA	lb.	.905 /	.975
30A	lb.	.245 /	.265
ST	lb.	.585 /	.615
Sersit #5	lb.	.75 /	1.05
Stablex A	lb.	.80 /	1.10
B, G	lb.	.50 /	.95
K	lb.	.27 /	.35
Stablex P	lb.	.35 /	.50
T	lb.	.14 /	.22
Surfactol 13	lb.	.345 /	.36
Webnix	lb.	1.50 /	2.50

Mold Lubricants

Acintol D	lb.	.06 /	.075
A-C Polyethylene	lb.	.30 /	.37
Alipal CO-433	lb.	.25 /	.45
CO-436	lb.	.22 /	.41
Aquarex Compounds	lb.	.21 /	.94
Carbowax 200, 300, 400	lb.	.22 /	.25
1500	lb.	.255 /	.2825
4000	lb.	.31 /	.32
6000	lb.	.35 /	.36
Castorwax	lb.	.3375/	.3575
Colite Concentrate	gal.	.90 /	1.15
D-Tak Dip #10	gal.	1.50	
DC Mold Release Fluid	lb.	3.14 /	4.75
Compound 4, 7	lb.	5.13 /	6.50
Emulsion 7	lb.	1.59 /	2.07
8, 35, 35A, 35B, 36	lb.	1.22 /	1.76
200 Fluid	lb.	3.14 /	4.75
ELA	lb.	.82	
FT Wax 200	lb.	.265 /	.42
300	lb.	.295 /	.45
Glycerized Liquid Lubricant, concentrated	gal.	1.25 /	1.63
Igepals	lb.	.2875	.74
Igepon AP-78	lb.	.44 /	.68
T-43	lb.	.145 /	.35
-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Lubrex	lb.	.27 /	.32
Lubri-Flo	gal.	10.00 /	12.05
Lustermold	lb.	.41	
L-41 Diethyl Silicone Oil	lb.	3.50	
Mold Paste	lb.	.25	
Monopole Oil	lb.	.16	
Monten Wax	lb.	.57	
Para Lube	lb.	.046 /	.048
Paraflint RG and RGU Synthetic Wax	lb.	.15 /	.22
Plaskon 8406, 8407	lb.	.30 /	.37
8416, 8417	lb.	.35 /	.42
8429	lb.	.40 /	.47
Pluronics	lb.	.335 /	.44
Poly-Brite PE-200	lb.	.28 /	.42
600	lb.	.42 /	.58

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE
(No agency commission allowed except on display units)

GENERAL RATES

Light face type $1.25 per line (ten words)
Bold face type $1.60 per line (eight words)
Allow nine words for keyed address.

SITUATIONS WANTED RATES

Light face type 40c per line (ten words)
Bold face type 55c per line (eight words)

SITUATIONS OPEN RATES

Light face type $1.00 per line (ten words)
Bold face type $1.40 per line (eight words)

Letter replies forwarded without charge, but no packages or samples.

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS OPEN

TECHNICAL DIRECTOR

Excellent opportunity available for well-rounded technical man. Knowledge of precision molded goods including background in newer polymers desirable. Address Box No. 2126, care of RUBBER WORLD.

CHEMIST—WITH RUBBER EXPERIENCE REQUIRED FOR compounding development and research on natural and synthetic rubber. Calender experience necessary. Résumé will be kept in confidence. Salary commensurate with ability and background. Plant located New York City area. Address Box No. 2127, care of RUBBER WORLD.

FOREMAN—RUBBER PRESS ROOM

Must have molded mechanical goods experience and be capable of supervision study, good pay, night shift, job located Philadelphia. State age, experience, and salary requirements in first letter. Address Box 2128, care of RUBBER WORLD.

SALES REPRESENTATIVE

Wanted by expanding New England manufacturer of precision molded rubber goods—chiefly diaphragms, O-rings, and allied products. Write full details. Address Box No. 2129, care of RUBBER WORLD.

REPRESENTATIVE FOR NEW ENGLAND TERRITORY. SEMI-retired, executive acquainted and familiar with plastic and rubber field. Full or part-time basis. Strictly on substantial commission basis. Prefer man with investment capital. Established firm now in similar line. Address Box No. 2130, care of RUBBER WORLD.

ADHESIVE CHEMIST OR ENGINEER: An experienced Chemist or Engineer for development work on the formulation and processing of rubber-based adhesives, particularly pressure-sensitive type. Must be able to handle development work with a minimum of supervision. Responsibility requires direct contact with production and merchandising.

Position is at a modern Research and Development Center forty miles from New York City in a rural New Jersey area. Send résumé of qualifications and experience to: JOHNS-MANVILLE RESEARCH CENTER, Manville, New Jersey. Attn: Technical Personnel Manager.

LATEX CHEMISTS—EXPERIENCE IN LATEX THREAD COMpounding and/or adhesives preferred, but not essential. Excellent opportunity with growing department of nationally known company. Location Metropolitan N. Y. Address Box No. 2133, care of RUBBER WORLD.

TECHNICAL SALES REPRESENTATIVE

Outstanding chemical sales organization serving the rubber industry offers excellent opportunity for graduate chemist or chemical engineer under thirty-one years of age having five to seven years' diversified experience in rubber compounding and processing. Applications held in strict confidence. Forward inexpensive photograph with outline of age and experience. Address Box No. 2134, care of RUBBER WORLD.

DEVELOPMENT RUBBER COMPOUNDS

Chemist with 2-5 years' experience for development position in Technical Sales Laboratory working on carbon black and synthetic rubber. Advancement opportunities. Please state qualifications and salary requirements. Address Box No. 2135, care of RUBBER WORLD.

CONSULTANTS & ENGINEERS

GIDLEY LABORATORIES, INC.
PHILIP TUCKER GIDLEY — "RESEARCH IN RUBBER"
Consulting engineering, formulas, product development, chemical and physical tests and factory surveys
Fairhaven Massachusetts

HALE & KULLGREN, INC.
Specialists in Processes and Plants for Rubber and Plastics
A Complete Engineering Service
Including: Economic Surveys; Process Design; Installation; Contracting and Operation.
613 E. Tallmadge Ave., Akron 10, Ohio

SITUATIONS WANTED

RUBBER TECHNOLOGIST DESIRES RESPONSIBLE POSITION. Seventeen years' experience in overall operations. Background includes compounding, research, development, production, cost estimation, management, etc. Address Box No. 2136, care of RUBBER WORLD.

TECHNICAL SALES AND/OR SERVICE TO THE RUBBER AND allied industries. Over sixteen years' experience in development, compounding, manufacturing, as well as technical service and sales. Address Box No. 2137, care of RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: ALL IN STOCK 6—465-gal. stainless-steel Reactors, 150# W.P., 165# jkt. 3—4' x 84" vert. Vulcanizers, quick-opening doors, ASME 130#. 1—Farrel 500-1500 HP. Horiz. Reducer. SEND FOR COMPLETE INVENTORY BULLETIN! PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

MACHINERY FOR SALE
#9 BANBURY
COMPLETE WITH MOTOR AND DRIVE
Good operating condition, can be inspected under power, located Eastern Pennsylvania. No dealers. Address Box No. 2131, care of RUBBER WORLD.

HYDRAULIC PRESSES, 800-ton multi-opening, 26" x 38" platens. 600-ton Southwark downstroke 32" x 36". 2500-ton downstroke 54" x 102". 375-ton upstroke 28" x 28". 300-ton upstroke 41" x 30". 300-ton upstroke 22" x 35". 300-ton multi-opening 40" x 40" platens. 250-ton French Oil upstroke 38" x 28". 170-ton upstroke 24" x 24". 150-ton Elmes upstroke 36" x 25". 140-ton 36" x 36" platens. 300-ton Stokes Transfer Molding Press. New & Used Lab. 6" x 13", 6" x 16", and 8" x 16" Mills and Calenders, and sizes up to 84". Baker-Perkins & Day Heavy-Duty Jack. Mixers up to 200 gals. Hydraulic Pumps & Accumulators, Rotary Cutters. Colton 5½ T Preform Machine Motor Driven. Single-Punch & Rotary Pre-Form Machines. Banbury Mixers, Crushers, Churns, Tubers, Vulcanizers, Bale Cutters, Gas Boilers, et cetera. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 107—8th STREET, BROOKLYN 15, NEW YORK. STERLING 8-1944.

WHEN YOU THINK OF RUBBER MACHINERY
Think of
JOHNSON MACHINERY
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Extruders, Tablet Presses, Injection Molders, Hydraulic Presses, Scrap Cutters, Calenders, Mills, Blenders, Mixers, Ovens, Hydraulic Pumps, Laminating and Molding Equipment. See Us First. JOHNSON MACHINERY CO., 679 Frelinghuysen Ave., Dept. RW, Newark, N. J. BIgelow 8-2500.

(Classified Advertisements Continued on Page 631)

Do you have used rubber machinery for sale?
HOUSTON RUBBER MACHINE CO.
3301 Jensen Drive **Houston 26, Texas**
Let us know your needs

HOWE MACHINERY CO., INC.
30 Gregory Avenue. Passaic, N. J.
DESIGNERS & BUILDERS
OF "V" BELT MANUFACTURING EQUIPMENT
Cord Latexing, expanding mandrels, automatic cutting, skiving, flipping and roll drive wrapping machines.
ENGINEERING FACILITIES FOR SPECIAL EQUIPMENT
Call or Write

Poly-Cone 125X	lb.	$1.22 /	$1.40
1000	lb.	.94 /	1.06
Polyglycol E series	lb.	.29 /	.42
RA-1, -2, -3	gal.	2.25 /	3.00
Rubber Glo	gal.	.94 /	.97
SM-33, -55, -61, -62	lb.	1.22 /	1.76
Soap, Hawkeye	lb.	1.35 /	1.45
Purity	lb.	.155 /	.165
Sodium stearate	lb.	.40	
Stoner's 700 series	gal.	1.20 /	1.25
800 series	gal.	1.26 /	1.70
900 series	gal.	1.55 /	2.55
A Series	gal.	1.80 /	4.50
Ucon 50-HB Series	lb.	.25 /	.375
Ulco	lb.	.12 /	.23
Vanfre	gal.	2.50 /	3.00

Odorants

Alamasks	lb.	.75 /	6.50
Coumarin	lb.	2.95 /	3.55
Curodex 19	lb.	4.75 /	5.05
188	lb.	5.75	
198	lb.	5.75	
Ethavan	lb.	6.75 /	7.35
Latex Perfume #7	lb.	4.00	
Neutroleum Gamma	lb.	3.60	
Rubber Perfume #10	lb.	2.60	
Vanillin, Monsanto	lb.	3.00 /	3.15

Plasticizers and Softeners

Acintol R	lb.	.065 /	.07
Adipol 2EH, 10A	lb.	.40 /	.435
BCA	lb.	.43 /	.455
ODY	lb.	.43 /	.465
Admex 710	lb.	.325	
711	lb.	.345	
744	lb.	.40	
Aro Lene #1980	lb.	.10 /	.12
Baker AA Oil	lb.	.195 /	.24
Crystal O Oil	lb.	.21 /	.255
Processed oils	lb.	.215 /	.235
Bardol, 639	lb.	.215 /	.235
B	lb.	.0625/	.065
Benzoflex 2-45	lb.	.26 /	.29
9-88	lb.	.27 /	.30
Bondogen	lb.	.55 /	.60
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125/	.021
521	lb.	.019 /	.02
BRH 2	lb.	.0213/	.0351
BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
BRV	lb.	.0475/	.0565
Bunarex Liquid	lb.	.0425/	.0555
Resins	lb.	.065 /	.1225
Bunnatol G, S	lb.	.40 /	.505
Butac	lb.	.125 /	.135
Butyl stearate, comml	lb.	.255	
Binney & Smith	lb.	.23 /	.26
Hardesty	lb.	.23 /	.26
Ohio-Apex	lb.	.245 /	.255
Cabflex HS-10	lb.	.44 /	.47
G. P.	lb.	.0125/	.02
R-100	lb.	.045 /	.0525
TT	lb.	.017 /	.0245
Califlux G. P.	lb.	.015 /	.0225
R-100	lb.	.0475/	.0575
T-T	lb.	.019 /	.0295
510, 550	lb.	.0275/	.0375
Capryl alcohol, comml	lb.	.195 /	.235
Binney & Smith	lb.	.18 /	.28
Hardesty	lb.	.18 /	.28
Chlorowax 40	lb.	.1625/	.1825
70	lb.	.185 /	.245
S	lb.	.21 /	.27
Cleo light	gal.	.17	
Circosol-2XH	gal.	.185	
Contogums	lb.	.0875/	.111
Cumar Resins	lb.	.065 /	.17
DBM (dibutyl-m-cresol)			
Darex	lb.	.32 /	.3475
DBP (dibutyl phthalate),			
comml	lb.	.30 /	.133
Darex	lb.	.30 /	.33
Eastman	lb.	.30 /	.33
Harwick Std. Chem. Co.	lb.	.325 /	.385
Hatco	lb.	.30 /	.33
Monsanto	lb.	.30 /	.33
Naugatuck	lb.	.30 /	.33
Ohio-Apex	lb.	.30 /	.335
PX-104	lb.	.30 /	.33
Rubber Corp. of America	lb.	.30 /	.44
Sherwin-Williams	lb.	.30 /	.33
DBS (dibutylsebacate)			
comml	lb.	.66 /	.69
Hatco	lb.	.66 /	.685
Monoplex	lb.	.66 /	.675
Naugatuck	lb.	.665 /	.69
PX-404	lb.	.665 /	.69
DCP (dicaprylphthalate),			
comml	lb.	.295 /	.325
Hatco	lb.	.295 /	.325
Monoplex	lb.	.30 /	.315
DDA (didecyladipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-236	lb.	.40 /	.55
DDP (didecylphthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-266	lb.	.295 /	.45
Hatco	lb.	.305 /	.435
Defoamer X-3	lb.	.355	
DIBA (diisobutyladipate)			
Cabflex	lb.	.4325/	.4625
Darex	lb.	.4325/	.4625
Eastman	lb.	.41 /	.44
Ohio-Apex	lb.	.41 /	.445
DIDA (diisodecyladipate)			
Monsanto	lb.	$0.425 /	$0.455
DIDP (diisodecylphthalate)			
Darex	lb.	.32 /	.35
Monsanto	lb.	.305 /	.335
Ohio-Apex	lb.	.295 /	.325
PX-120	lb.	.305 /	.335
Dielex B	lb.	.06	
Diethylene glycol, comml	lb.	.1525/	.1825
Wyandotte	lb.	.15 /	.165
Dinopol IDO	lb.	.285 /	.32
DIOA (diisooctyladipate)			
Cabflex	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-208	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DIOP (diisooctylphthalate),			
comml	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.305 /	.335
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.28 /	.315
PX-108	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.32 /	.34
DIOS (diisooctylsebacate),			
comml	lb.	.61 /	.64
Rubber Corp. of America	lb.	.61 /	.84
DIOZ (diisooctylazelate)			
Cabflex	lb.	.48 /	.51
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.06 /	.0625
DNODP (di-n-octyl-n-decyl			
phthalate), Monsanto	lb.	.345 /	.375
DOA (dioctyladipate),			
comml	lb.	.425 /	.455
Cabflex	lb.	.425 /	.455
Eastman	lb.	.40 /	.43
Good-rite GP-233	lb.	.40 /	.55
Hatco	lb.	.435 /	.465
Monsanto	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-238	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DOP (dioctylphthalate),			
comml	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.305 /	.335
Good-rite GP-261	lb.	.285 /	.44
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.28 /	.315
Polycizer 162	lb.	.28 /	.435
PX-138	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.305 /	.335
DOS (dioctylsebacate),			
comml	lb.	.61 /	.64
Eastman	lb.	.61 /	.64
Hatco	lb.	.61 /	.635
Monoplex	lb.	.61 /	.635
Naugatuck	lb.	.615 /	.64
PX-438	lb.	.615 /	.64
Rubber Corp. of America	lb.	.61 /	.84
Drapex 3.2	lb.	.40 /	.54
Dutch Boy NL-A10 (DBP)	lb.	.30 /	.33
-A20 (DOP), A30 (DIOP)	lb.	.305 /	.335
-A54	lb.	.295 /	.325
-C20 (DOS)	lb.	.61 /	.63
-F21	lb.	.395 /	.425
-F31	lb.	.44 /	.47
-F41	lb.	.48 /	.51
Dutrex 6	lb.	.025 /	.035
Dymerex Resin	lb.	.135 /	.1475
Emulphor EL-719	lb.	.52 /	.73
Endor	lb.	.65	
Ethox	lb.	.43 /	.455
Ethylene glycol, comml	lb.	.135 /	.165
Wyandotte	lb.	.1325/	.1425
Flexol 3 GH	lb.	.44 /	.46
3 GO	lb.	.53 /	.55
4 GO	lb.	.325 /	.355
10-A	lb.	.425 /	.455
426	lb.	.27 /	.30
810, 810X, 10-10, 10-10X	lb.	.305 /	.335
TOF, A-26	lb.	.435 /	.465
Flexricin P-4	lb.	.3475/	.3625
P-6	lb.	.415 /	.43
P-8	lb.	.3475/	.3625
PG-16	lb.	.335 /	.35
Fortex	lb.	.125 /	.145
G. B. Asphaltic Flux	gal.	.097 /	.177
Naphthenic Neutrals	gal.	.125 /	.215
Process oil, light	lb.	.0275/	.0375
Medium	lb.	.0375/	.0475
Galex W-100	lb.	.155 /	.18
W-100 D	lb.	.1525/	.1775
Gilsowax B	lb.	.0975/	.11
Harchemex	lb.	.24 /	.345
Harflex	lb.	1.25 /	1.335
40	lb.	.64 /	.725
50, 80, 300	lb.	.58 /	.665
60	lb.	.62 /	.705
90	lb.	.88 /	.965
120, 150	lb.	.305 /	.395
140, 160	lb.	.30 /	.33
180	lb.	.295 /	.38
220, 250	lb.	.425 /	.515
260	lb.	.42 /	.45
280	lb.	.42 /	.51
500	lb.	.315 /	.41
HB-20	lb.	.15 /	.17
40	lb.	.19 /	.21
Heavy Resin Oil	lb.	.0225/	.0375
HSC-13	lb.	$0.25 /	$0.32
39	lb.	.22 /	.29
Hycar 1312	lb.	.60	
Indonex	gal.	.11 /	.195
Kapsol	lb.	.33 /	.35
Kenflex A, L	lb.	.26 /	.27
B	lb.	.23 /	.24
N	lb.	.18 /	.19
Kessoflex 103	lb.	.405	
105	lb.	.3325	
106	lb.	.38	
107	lb.	.525	
110	lb.	.24	
111	lb.	.28	
KP-23	lb.	.29 /	.325
90	lb.	.40 /	.435
140	lb.	.46 /	.485
201	lb.	.58 /	.59
220	lb.	.32 /	.355
555	lb.	.565 /	.57
Kronisol	lb.	.33 /	.365
Kronitex AA, I, K-3, Mx	lb.	.325 /	.36
LX-685, -125, -135	lb.	.125 /	.135
Marvinol plasticizers	lb.	.28 /	.8825
Methox	lb.	.385 /	.41
Monoplex S-38	lb.	.215 /	.24
S-71	lb.	.45 /	.475
Morflex	lb.	.25 /	.65
Natac	lb.	.12 /	.13
Neoprene Peptizer P-12	lb.	1.05	
Nevillac	lb.	.31 /	.85
Neville R Resins	lb.	.145 /	.205
Nevinol	lb.	.24	
No. 1-D heavy oil	lb.	.065	
ODA (octyldecyladipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-235	lb.	.40 /	.55
ODP (octyldecylphthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-265	lb.	.29 /	.445
Hatco	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Ohopex Q-10	lb.	.295 /	.33
R-9	lb.	.3525/	.3775
Orthonitro benzophenol,			
comml	lb.	.13 /	.15
Monsanto	lb.	.13 /	.15
Palmalene	lb.	.15	
Panaflex BN-1	lb.	.185 /	.225
Para Flux, regular	gal.	.10 /	.2125
No. 2016	gal.	.165 /	.24
2332	gal.	.11	
4205	lb.	.1075/	.2125
Para Lube	lb.	.046 /	.048
Resins	lb.	.04 /	.045
Paradene Resins	lb.	.07 /	.08
Paraplex 5-B	lb.	.29 /	.3475
Al-111	lb.	.32 /	.3275
G-25	lb.	.76 /	.77
-40	lb.	.4825/	.51
-50	lb.	.39 /	.4175
-53	lb.	.4325/	.46
-60	lb.	.325 /	.35
-62	lb.	.345 /	.37
RG-7	lb.	.33 /	.335
-8	lb.	.505 /	.5125
-10	lb.	.52 /	.5275
Pepton 22	lb.	.83 /	.86
65	lb.	1.23 /	1.26
65-B	lb.	.83 /	.86
Philrich 5	gal.	.11	
Picco Resins	lb.	.135 /	.195
480 Oilproof Series	lb.	.18 /	.23
Aromatic Plasticizers	lb.	.05 /	.065
Liquid Resin D-165 (Y)	lb.	.06 /	.075
(Z-3)	lb.	.07 /	.085
(Z-6)	lb.	.08 /	.095
S. O. S	gal.	.29 /	.34
Piccocizers	lb.	.04 /	.055
Piccolastic Resins	lb.	.1855/	.34
Piccolyte Resins	lb.	.205 /	.245
Piccopale Resins	lb.	.12 /	.135
Piccovars	lb.	.165 /	.20
Piccovol	lb.	.025 /	.038
Pictar	gal.	.25 /	.30
Pigmentar	lb.	.046 /	.0634
Pigmentaroil	lb.	.045 /	.0634
Pitch, Burgundy, Sunny			
South	lb.	.1030/	.1085
Plasticizers			
42	lb.	.34 /	.40
B	lb.	.35 /	.45
DP-520	lb.	.435 /	.455
MP	lb.	.035 /	.0755
MT-511	lb.	.6925/	.7425
ODN	lb.	.35 /	.475
SC	lb.	.40 /	.515
Plastoflex #3	lb.	.52 /	.57
#520	lb.	.36 /	.435
DBE	lb.	.50 /	.55
MGB	lb.	.29 /	.37
SP-2	lb.	.43 /	.48
VS	lb.	.3575/	.3975
Plastogen	lb.	.0775/	.08
Plastone	lb.	.25 /	.32
Polycin 470	lb.	.325 /	.34
Polycizers	lb.	.28 /	.55
162	lb.	.285 /	.44
Polymel C-128	lb.	.1775/	.1875
D	lb.	.225 /	.235
D-TAC	lb.	.1975/	.215
DX, C-130	lb.	.1375/	.1475
Poly-Sperse AP-2	lb.	.23 /	.295
AP-300	lb.	.26 /	.325
LC-20	lb.	.26 /	.325
PT67 Light Pine Oil	gal.	.60	
101 Pine Tar Oil	lb.	.046 /	.0634
Pine Tars	lb.	.046 /	.0634
Reogen	lb.	.1325/	.135

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Resin C pitch	lb.	$0.0225/	$0.031
R6-3	lb.	.38 /	.40
Resinex 10, 25, 50, 110	lb.	.04 /	.045
70	lb.	.0325/	.0375
85, 100	lb.	.035 /	.04
115	lb.	.0375/	.0425
L-2, L-3, L-4, L-5	lb.	.0225/	.03
Rosin Oil, Sunny South	gal.	.58 /	.76
RPA No. 2	lb.	.82	
3	lb.	.48	
Conc.	lb.	.85	
5	lb.	.68	
6	lb.	1.62	
RSN Flux	gal.	.10 /	.91
Rubber Oil B-5	lb.	.0225/	.0355
Rubberol	lb.	.18 /	.2725
Santicizer 1-H	lb.	.50 /	.51
3	lb.	.46 /	.47
8	lb.	.43 /	.44
9	lb.	.39 /	.42
140	lb.	.325 /	.36
141	lb.	.34 /	.37
160	lb.	.25 /	.28
601	lb.	.325	
602	lb.	.305	
B-16	lb.	.4875/	.4975
E-15	lb.	.5075/	.5375
Santocizer	lb.	.4275/	.4575
Sebacic acid, purified, comml.	lb.	.59 /	.65
Binney & Smith	lb.	.64 /	.76
Hardesty	lb.	.64 /	.76
C. P.- Binney & Smith	lb.	.72 /	.84
Harchem	lb.	.69 /	.89
Sherolatum Petroleum	lb.	.05 /	.10
Softener #20	gal.	.10 /	.20
Special Rubber Resin 100	lb.	.1675/	.2175
Staflex AX	lb.	.43	
DBES	lb.	.61 /	.635
Syn-Tac	gal.	.33 /	.35
Synthol	lb.	.17 /	.2625
Thiokol TP-90B	lb.	.59	
-95	lb.	.65	
Tricresyl phosphate, comml.	lb.	.33 /	.36
Cabflex	lb.	.345 /	.375
Monsanto	lb.	.325 /	.36
Naugatuck	lb.	.33 /	.36
PX-917	lb.	.33 /	.36
Triphenyl phosphate, comml.	lb.	.39 /	.40
Monsanto	lb.	.39 /	.40
Turgum S	lb.	.1075/	.1175
Tysonite	lb.	.24 /	.2475
United	gal.	.69 /	1.20
X-1 Resinous Oil	lb.	.0225/	.0325

Reclaiming Oils

Acintol C, P	lb.	.02 /	.03
Bardol, 639	lb.	.0275/	.0375
B	lb.	.0625/	.065
BRH 2	lb.	.0213/	.0351
BRT 3	lb.	.018 /	.0265
4	lb.	.025 /	.026
7	lb.	.03 /	.031
BRV	lb.	.0475/	.0565
Burco-RA	lb.	.053 /	.0805
BWH-1	lb.	.16 /	.18
Dipolymer Oil	gal.	.33 /	.43
Dispersing Oil No. 10	lb.	.06 /	.0625
G. B. Oils	gal.	.115 /	.275
Heavy Resin Oil	lb.	.0225/	.0375
LX-572	gal.	.27 /	.32
-759	gal.	.1375	
-777, -809, -859	gal.	.23 /	.33
-869	gal.	.33 /	.43
-871	gal.	.34 /	.44
No. 3186	gal.	.28 /	.295
Picco 6535	gal.	.25 /	.30
C-33	gal.	.215 /	.315
-42	gal.	.23 /	.33
D-4	gal.	.27 /	.37
E-5	gal.	.25 /	.35
Q-Oil	gal.	.286 /	.36
PT 67	gal.	.60	
101 Pine Tar Oil	lb.	.0427/	.061
150 Pine Solvent	gal.	.44	
Reclaiming Oil #3186	gal.	.28 /	.385
-G	gal.	.25 /	.365
4039-M	gal.	.3275/	.3975
-Y	gal.	.30 /	.37
RR-10	lb.	.37	
S. R. O.	lb.	.015 /	.0225
X-1 Resinous Oil	lb.	.0225/	.0325

Reinforcers, Other Than Carbon Black

Angelo Shellacs	lb.	.485 /	.7325
Borden, Chem. Div.			
Arcco 978-42B	lb.	.18 /	.19
1073-18B	lb.	.135 /	.145
1294-36B	lb.	.115 /	.125
1301-12B	lb.	.15 /	.16
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125/	.021
521	lb.	.019 /	.02
Bunarex Resins	lb.	.065 /	.1225
Cab-o-sil	lb.	.68 /	.75
Calcene NC	ton	80.00 /	100.00
TM	ton	82.50 /	102.50
Calco S. A.	lb.	.85 /	.88
Clays			
Aiken	ton	14.00	
Aluminum Flake	ton	22.25 /	60.00
Buca	ton	45.00	
Burgess Iceberg	ton	50.00 /	80.00
Icecap K	ton	65.00 /	90.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00
Catalpo	ton	$35.00	
Crown	ton	14.00 /	$33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
L. G. B.	ton	17.00	
Paragon	ton	13.50 /	33.00
Pigment No. 33	ton	37.00	
Recco	ton	14.00	
Suprex	ton	14.00 /	33.50
Swanee	ton	12.50	
Whitetex	ton	50.00	
Windsor	ton	14.00 /	30.00
Witco No. 1	ton	14.00 /	30.00
No. 2	ton	13.50 /	30.00
Clearcarb	lb.	.1175/	.1255
Cumar Resins	lb.	.065 /	.17
Darex Resins	lb.	.42 /	.49
DC Silica	lb.	1.45 /	1.65
Diatomaceous silica	ton	32.00 /	48.00
Good-rite 2007		.36 /	.38
2057		.30 /	.31
K Series Polymers	lb.	.15 /	.37
233	lb.	.08 /	.095
X303	lb.	.40 /	.45
Hycar 2001	lb.	.55	
2007	lb.	.39	
Indulins	lb.	.06 /	.08
Kralac A-EP	lb.	.43 /	.54
Laminar	ton	30.00	
Magnesium carbonate, Marinco CL	lb.	.105 /	.135
Marbon Resins	lb.	.36 /	.43
Multifex MM	ton	117.50 /	137.50
Super	ton	167.50 /	187.50
Neville Resins			
465	lb.	.075 /	.08
LX-509	lb.	.33 /	.35
Nebony	lb.	.045 /	.05
Paradene	lb.	.07 /	.08
R	lb.	.145 /	.205
Para Resins 2457, 2718	lb.	.04 /	.4575
Parapol S-Polymers	lb.	.44	
Picco Resins	lb.	.13 /	.225
Piccolyte Resins	lb.	.205 /	.275
Piccoumaron Resins	lb.	.07 /	.19
Piccovars	lb.	.145 /	.20
Pliolite NR types	lb.	.98 /	1.33
S-3	lb.	.42 /	.49
S-6	lb.	.36 /	.43
-6B	lb.	.36 /	.43
Plio-Tuf G85C	lb.	.52 /	.59
Purecal M	ton	56.75 /	71.75
SC, T	ton	110.00 /	125.00
U	ton	120.00 /	135.00
R-B-H 510	lb.	.15 /	.22
Resinex	lb.	.0225/	.1025
Rubber Resin LM-4	lb.	.28 /	.35
Silene EF	ton	120.00 /	140.00
Silvacons	ton	55.00 /	85.00
Transphalt	lb.	.0225 /	.0525
Witcarb P	ton	117.50 /	153.50
R	ton	127.50 /	163.50
Regular	ton	60.00 /	96.00
Zeolex 23	ton	120.00 /	140.00
Zinc oxide, commercial†	lb.	.135 /	.1775

Retarders

Benzoic acid TBAO-2	lb.	.44	
E-S-E-N	lb.	.37 /	.39
Good-rite Vultrol	lb.	.62 /	.66
R-17 Resin	lb.	.1075/	.36
Retarder ASA	lb.	.57	
J	lb.	.62 /	.64
PD	lb.	.39 /	.41
W	lb.	.42	
Retardex	lb.	.47 /	.50
Thionex	lb.	1.14	
Wiltrol P	lb.	.37 /	.39

Solvents

Bondogen	lb.	.55 /	.60
Butyrolactone	lb.	.60 /	.65
Cosol #1	gal.	.37 /	.43
#2	gal.	.42 /	.48
Dichloro Pentanes	lb.	.04 /	.07
Dipentene DD, Sunny South	gal.	.42 /	.63
Ethylene dichloride, comml.	lb.	.09 /	.122
Hi-Flash 2-50-W	gal.	.41	
Pale yellow	gal.	.39	
LX-572	gal.	.27 /	.32
-748	gal.	.16 /	.23
Methyl-2-pyrrolidone	lb.	.75 /	.80
Neville Nos. 100, 104	gal.	.52 /	.60
106	gal.	.38 /	.46
Nevsolv H, 200	gal.	.19 /	.29
HF, T. 30	gal.	.24 /	.34
Penetrell	gal.	.42 /	.63
Picco Hi-Solv Solvents	gal.	.16 /	.48
Pine Oil DD, Sunny South	lb.	.15	
PT 150 Pine Solvent	gal.	.44	
Skellysolve-B	gal.	.17	
-H	gal.	.148	
-R, -V	gal.	.139	
-C	gal.	.162	
Stauffer Carbon Disulfide	lb.	.0525/	.085
Tetrachloride	lb.	.0825/	.475

Tackifiers

Acintol R	lb.	.065 /	.07
Bardol, 639	lb.	.0275/	.0375
Borden, Arcco			
A25, A26, 716-30	lb.	.18 /	.19
555-40R	lb.	.185 /	.205
620-32B	lb.	.20 /	.21
716-35	lb.	.17 /	.18
1041-21	lb.	.165 /	.175
BRH 2	lb.	$0.0213/	$0.0351
Bunarex Resins	lb.	.065 /	.1225
Chlorowax 70	lb.	.18 /	.24
Contogums	lb.	.0875/	.11
Cumar Resins	lb.	.065 /	.17
Galex W-100	lb.	.155 /	.17
W-100D	lb.	.1525/	.1625
Indopol H-35	gal.	.65 /	.81
H-50	gal.	.70 /	.86
-100	gal.	.85 /	1.05
-300	gal.	1.00 /	1.21
L-10	gal.	.40 /	.56
-50	gal.	.45 /	.61
-100	gal.	.55 /	.71
Kenflex resins	lb.	.18 /	.27
Koresin	lb.	.90 /	1.10
Natac	lb.	.12 /	.13
Nevindene	lb.	.15 /	.18
Picco Resins	lb.	.13 /	.185
Piccolastic Resins	lb.	.1855/	.34
Piccolyte Resins	lb.	.185 /	.25
Piccopale Resins	lb.	.089 /	.13
Piccoumaron Resins	lb.	.07 /	.185
R-B-H 510	lb.	.15 /	.22
Roelflex 1118A	lb.	.39	
Synthetic 100	lb.	.41	
Synthol	lb.	.17 /	.2625
United	gal.	.69 /	1.20

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.60	
G-M-F #113, #117	lb.	.90	
HMDA-Carbamate	lb.	4.50 /	4.90
Ko-Blend I, S	lb.	.39	
Litharge (*See Accelerator-Activators, Inorganic*)			
Magnesium oxide	lb.	.2525/	.38
Maglite D, K	lb.	.2575/	.285
M	lb.	.2975/	.325
Red Lead (*See Accelerator-Activators, Inorganic*)			
Sulfasan R	lb.	1.55 /	1.57
Sulfur flour, comml.	100 lbs.	2.55 /	3.30
Aero	100 lbs.	2.40 /	7.75
Crystex	lb.	.195 /	.23
Insoluble 60	lb.	.125 /	.13
Rubbermakers	100 lbs.	2.65 /	4.55
Stauffer	lb.	.0265/	.054
Telloy	lb.	2.50	
VA-7	lb.	.50 /	.60
Vandex	lb.	15.50	
Vultac No. 2	lb.	.47 /	.755
3	lb.	.51 /	.795
White lead silicate (*See Accelerator-Activators, Inorganic*)			

Great Britain

(*Continued from page 604*)

superior to anything previously made in England. It is non-staining, and its main use is in the manufacture of adhesive plasters, insulating tapes, and other pressure-sensitive tapes. In the past Santovar A had to be imported from the United States.

Brazil

Preliminary figures for the consumption of rubber by Brazil during the first quarter of 1957 show a total of 11,386 metric tons, including 9,204 tons of natural rubber, 364 tons of latex, 164 tons of synthetic rubber and latex, and 1,654 tons of reclaim.

The tire industry (covering repair material also) absorbed 81% of the natural rubber, 13% of the latex, 26% of synthetic rubber and latex, and 18% of the reclaimed rubber. In the period considered, production of tires for motor vehicles totaled 461,883 units and included 227,723 passenger-car tires, 194,460 bus and truck tires, 9,551 tires for agricultural tractors and machines, 2,689 tires for earth movers, and 1,128 airplane tires. Tubes for motor vehicle tires came to 313,061 units.

Output of cycle tires and tubes in the same period amounted to 266,490 and 254,985 units, respectively.

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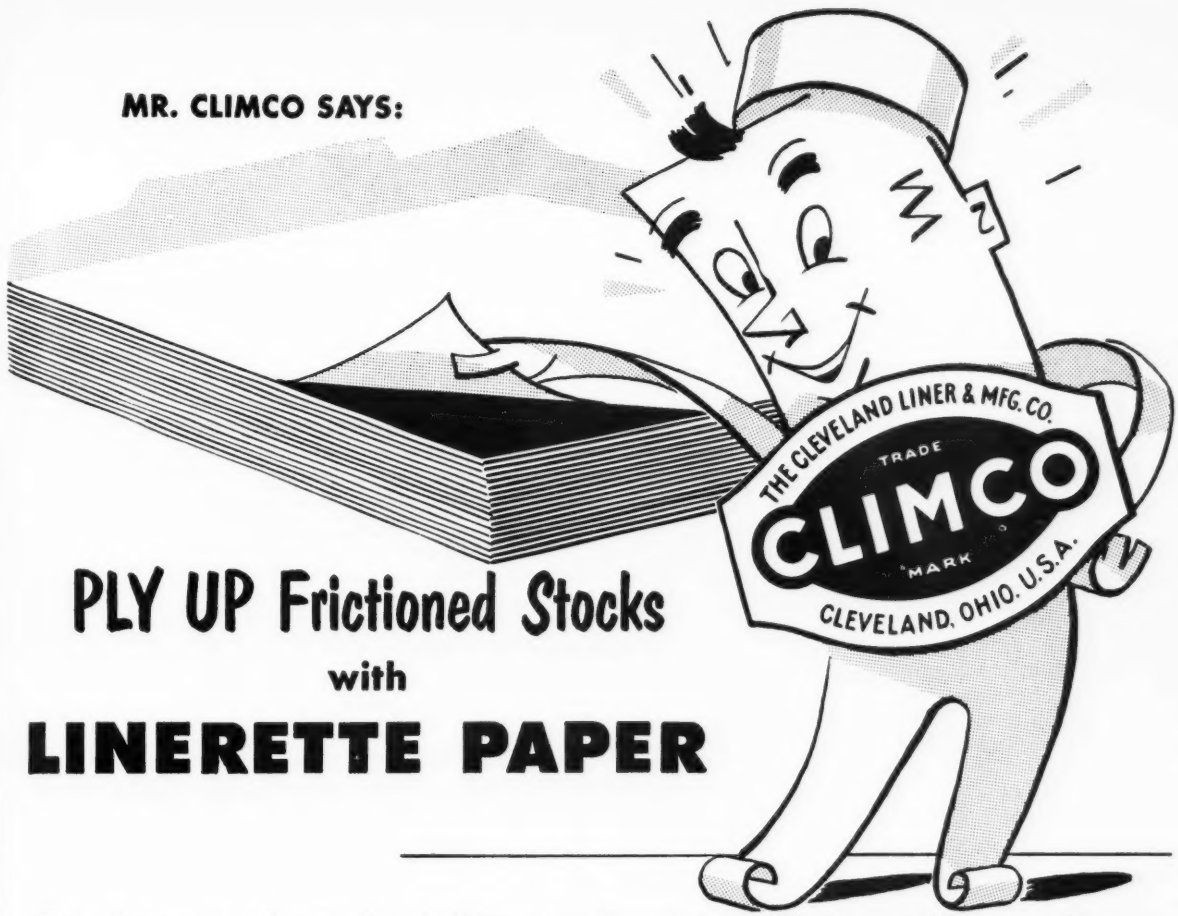

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